BERKELEY CITY COUNCIL FACILITIES, INFRASTRUCTURE, TRANSPORTATION, ENVIRONMENT & SUSTAINABILITY COMMITTEE
REGULAR MEETING

Wednesday, June 21, 2023
2:00 PM

2180 Milvia Street, 1st Floor - Cypress Room

Committee Members:

Councilmembers Terry Taplin, Kate Harrison, and Rigel Robinson
Alternate: Councilmember Mark Humbert

This meeting will be conducted in a hybrid model with both in-person attendance and virtual participation. For in-person attendees, face coverings or masks that cover both the nose and the mouth are encouraged. If you are feeling sick, please do not attend the meeting in person.

Remote participation by the public is available through Zoom. To access the meeting remotely using the internet: Join from a PC, Mac, iPad, iPhone, or Android device: Use URL https://cityofberkeley-info.zoomgov.com/j/1606960872. If you do not wish for your name to appear on the screen, then use the drop down menu and click on "rename" to rename yourself to be anonymous. To request to speak, use the “raise hand” icon on the screen. To join by phone: Dial **1-669-254-5252 or 1-833-568-8864 (Toll Free)** and Enter Meeting ID: **160 696 0872.** If you wish to comment during the public comment portion of the agenda, press *9 and wait to be recognized by the Chair.

To submit a written communication for the Committee’s consideration and inclusion in the public record, email policycommittee@cityofberkeley.info.

Written communications submitted by mail or e-mail to the Facilities, Infrastructure, Transportation, Environment & Sustainability Committee by 5:00 p.m. the Friday before the Committee meeting will be distributed to the members of the Committee in advance of the meeting and retained as part of the official record.

AGENDA

Roll Call

Public Comment on Non-Agenda Matters

Minutes for Approval

Draft minutes for the Committee's consideration and approval.

1. Minutes - June 7, 2023

Committee Action Items

The public may comment on each item listed on the agenda for action as the item is taken up. The Chair will determine the number of persons interested in speaking on each item. Up to ten (10) speakers may speak for two minutes. If there are more than ten persons interested in speaking, the Chair may limit the public comment for all speakers to one minute per speaker. Speakers are permitted to yield their time to one other speaker, however no one speaker shall have more than four minutes.

Following review and discussion of the items listed below, the Committee may continue an item to a future committee meeting, or refer the item to the City Council.

2. Adopt an Ordinance Adding a New Chapter 12.01 to the Berkeley Municipal Code Establishing Emergency Greenhouse Gas Limits, Process for Updated Climate Action Plan, Monitoring, Evaluation, Reporting and Regional Collaboration
From: Councilmember Harrison (Author), Councilmember Bartlett (Co-Sponsor) and Councilmember Hahn (Co-Sponsor)
Referred: November 15, 2021
Due: July 31, 2023
Recommendation: 1. Adopt an ordinance adding a new Chapter 12.01 to the Berkeley Municipal Code (BMC) establishing Emergency Greenhouse Gas Limits with an effective date of [ ], 2022.
2. Refer to the FY23-24 Budget Process $[ ] consistent with implementing the requirements of Sections 12.01.040, 12.01.050, 12.01.060.
Financial Implications: See report
Contact: Kate Harrison, Councilmember, District 4, (510) 981-7140

Committee Action Items

3. 51 Bus Rapid Transit
From: Councilmember Taplin (Author)
Referred: November 28, 2022
Due: June 21, 2023

Recommendation: 1) Refer to the City Manager the development of an implementation and community engagement plan to install Bus Rapid Transit, including dedicated bus lanes, transit signal priority, elevated platforms, and enhanced sections, on the AC Transit 51B route along University Avenue from Sixth Street to Shattuck Avenue and along Shattuck Avenue from University Avenue to Durant Avenue, with engagement centering pedestrian, cyclist, transit and mobility justice advocates, the disability rights community, local faith communities, merchants, neighboring residential communities inclusive of tenants, seniors, and students, and historically marginalized communities.

2) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along University Avenue from 6th Street to Oxford Street, consistent with the City of Berkeley's 2017 Bicycle Plan and integrating pedestrian amenities consistent with the City of Berkeley's 2020 Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the City of Berkeley General Plan's 2001 Transportation Element and the Alameda County Transportation Commission's (ACTC) 2016 Countywide Multimodal Arterial Plan.

3) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along Oxford Street from Virginia Street to Durant Avenue consistent with the Bicycle Plan and integrating pedestrian amenities consistent with the Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the Transportation Element and ACTC's Countywide Multimodal Arterial Plan. It will be coordinated with proposed improvements to transit performance on this Primary Transit Route, such as bus boarding islands, transit-only lanes, transit signal priority/queue jump lanes, far-side bus stop relocations, and other improvements as described in AC Transit's 2016 Major Corridor Study.

4) Refer $X to the Fiscal Year XX-XX Budget Process to install quick-build bus station improvements along the AC Transit 51B route.

5) Initiate consultation with AC Transit and UC Berkeley Bear Transit as soon as possible on the planning, scoping, and implementation of these items.

Financial Implications: See report

Contact: Terry Taplin, Councilmember, District 2, (510) 981-7120

Committee Action Items

4. **Adopt an Ordinance Adding Chapter 12.39 to the Berkeley Municipal Code to Regulate Deconstruction and Construction Materials Management**
   From: Councilmember Harrison (Author)
   Referred: June 12, 2023
   Due: November 27, 2023
   Recommendation: 1. Adopt an ordinance adding Chapter 12.39 to the Berkeley Municipal Code to regulate management of deconstruction and construction materials.
   2. Refer to the November 2023 Budget AAO Process $[x] to administer and enforce the ordinance.
   3. Refer to the City Attorney’s Office to conduct a nexus fee study for a potential social cost of carbon fee applied to landfilled construction and demolition debris.
   Financial Implications: See report
   Contact: Kate Harrison, Councilmember, District 4, (510) 981-7140

Unscheduled Items

These items are not scheduled for discussion or action at this meeting. The Committee may schedule these items to the Action Calendar of a future Committee meeting.

Items for Future Agendas

- **Requests by Committee Members to add items to future agendas**

Adjournment

~~~~~~

Written communications addressed to the Facilities, Infrastructure, Transportation, Environment & Sustainability Committee and submitted to the City Clerk Department will be distributed to the Committee prior to the meeting.

This meeting will be conducted in accordance with the Brown Act, Government Code Section 54953 and applicable Executive Orders as issued by the Governor that are currently in effect. Members of the City Council who are not members of the standing committee may attend a standing committee meeting even if it results in a quorum being present, provided that the non-members only act as observers and do not participate in the meeting. If only one member of the Council who is not a member of the committee is present for the meeting, the member may participate in the meeting because less than a quorum of the full Council is present. Any member of the public may attend this meeting. Questions regarding this matter may be addressed to Mark Numainville, City Clerk, (510) 981-6900.

COMMUNICATION ACCESS INFORMATION:
This meeting is being held in a wheelchair accessible location. To request a disability-related accommodation(s) to participate in the meeting, including auxiliary aids or services, please contact the Disability Services specialist at (510) 981-6418 (V) or (510) 981-6347 (TDD) at least three business days before the meeting date. Attendees at public meetings are reminded that other attendees may be sensitive to various scents, whether natural or manufactured, in products and materials. Please help the City respect these needs.

~~~~~~

I hereby certify that the agenda for this meeting of the Standing Committee of the Berkeley City Council was posted at the display case located near the walkway in front of the Maudelle Shirek Building, 2134 Martin Luther King Jr. Way, as well as on the City's website, on June 15, 2023.

Mark Numainville, City Clerk

Communications

Communications submitted to City Council Policy Committees are on file in the City Clerk Department at 2180 Milvia Street, 1st Floor, Berkeley, CA, and are available upon request by contacting the City Clerk Department at (510) 981-6908 or policycommittee@cityofberkeley.info.

BERKELEY CITY COUNCIL FACILITIES, INFRASTRUCTURE, TRANSPORTATION, ENVIRONMENT & SUSTAINABILITY COMMITTEE SPECIAL MEETING MINUTES

Wednesday, June 7, 2023
2:00 PM

2180 Milvia Street, 6th Floor - Redwood Room

Committee Members:

Councilmembers Terry Taplin, Kate Harrison, and Rigel Robinson
Alternate: Councilmember Mark Humbert

This meeting will be conducted in a hybrid model with both in-person attendance and virtual participation. For in-person attendees, face coverings or masks that cover both the nose and the mouth are encouraged. If you are feeling sick, please do not attend the meeting in person.

Remote participation by the public is available through Zoom. To access the meeting remotely using the internet: Join from a PC, Mac, iPad, iPhone, or Android device: Use URL https://cityofberkeley-info.zoomgov.com/j/1615164582. If you do not wish for your name to appear on the screen, then use the drop down menu and click on "rename" to rename yourself to be anonymous. To request to speak, use the "raise hand" icon on the screen. To join by phone: Dial **1-669-254-5252 or 1-833-568-8864 (Toll Free)** and Enter **Meeting ID: 161 516 4582**. If you wish to comment during the public comment portion of the agenda, press *9 and wait to be recognized by the Chair.

To submit a written communication for the Committee's consideration and inclusion in the public record, email policycommittee@cityofberkeley.info.

Written communications submitted by mail or e-mail to the Facilities, Infrastructure, Transportation, Environment & Sustainability Committee by 5:00 p.m. the Friday before the Committee meeting will be distributed to the members of the Committee in advance of the meeting and retained as part of the official record.

MINUTES

Roll Call: 2:00 p.m.

Councilmembers Robinson and Harrison present.

Councilmember Taplin absent.

Public Comment on Non-Agenda Matters: No Speakers.

Minutes for Approval

Draft minutes for the Committee's consideration and approval.

1. Minutes - May 4, 2023

Action: 0 speakers. M/S/C (Harrison/Robinson) to approve the May 4, 2023 minutes.
Vote: Ayes – Robinson, Harrison; Noes – None; Abstain – None; Absent – Taplin

Committee Action Items

The public may comment on each item listed on the agenda for action as the item is taken up. The Chair will determine the number of persons interested in speaking on each item. Up to ten (10) speakers may speak for two minutes. If there are more than ten persons interested in speaking, the Chair may limit the public comment for all speakers to one minute per speaker. Speakers are permitted to yield their time to one other speaker, however no one speaker shall have more than four minutes.

Following review and discussion of the items listed below, the Committee may continue an item to a future committee meeting, or refer the item to the City Council.

2. Discussion and possible action on new proposed regular meeting time: First and third Wednesday of the month, 2:00 p.m.

Action: 0 speakers. M/S/C (Harrison/Robinson) to approve changing the regular meeting time to the first and third Wednesday of the month at 2:00 p.m.
Vote: Ayes – Robinson, Harrison; Noes – None; Abstain – None; Absent – Taplin

3. Audit Status Report: Underfunded Mandate: Resources, Strategic Plan, and Communication Needed to Continue Progress towards the Year 2020 Zero Waste Goal
From: City Manager
Referred: November 3, 2022
Due: July 25, 2023
Contact: Liam Garland, Public Works, (510) 981-6300

Action: 0 speakers. M/S/C (Harrison/Robinson) to send the item to Council with a positive recommendation.
Vote: Ayes – Robinson, Harrison; Noes – None; Abstain – None; Absent – Taplin

4. **Audit Status Report: Unified Vision of Zero Waste Activities Will Help Align Service Levels with Billing and Ensure Customer Equity**
From: City Manager
Referred: November 3, 2022
Due: July 25, 2023
Contact: Liam Garland, Public Works, (510) 981-6300

Action: 0 speakers. M/S/C (Harrison/Robinson) to send the item to Council with a positive recommendation.
Vote: Ayes – Robinson, Harrison; Noes – None; Abstain – None; Absent – Taplin

5. **Adopt an Ordinance Adding a New Chapter 12.01 to the Berkeley Municipal Code Establishing Emergency Greenhouse Gas Limits, Process for Updated Climate Action Plan, Monitoring, Evaluation, Reporting and Regional Collaboration**
From: Councilmember Harrison (Author), Councilmember Bartlett (Co-Sponsor) and Councilmember Hahn (Co-Sponsor)
Referred: November 15, 2021
Due: July 31, 2023
Recommendation: 1. Adopt an ordinance adding a new Chapter 12.01 to the Berkeley Municipal Code (BMC) establishing Emergency Greenhouse Gas Limits with an effective date of [ ], 2022.
2. Refer to the FY23-24 Budget Process $[ ] consistent with implementing the requirements of Sections 12.01.040, 12.01.050, 12.01.060.
Financial Implications: See report
Contact: Kate Harrison, Councilmember, District 4, (510) 981-7140

Action: 0 speakers. Item continued to the Facilities, Infrastructure, Transportation, Environment & Sustainability Committee's next regular meeting.

Unscheduled Items

These items are not scheduled for discussion or action at this meeting. The Committee may schedule these items to the Action Calendar of a future Committee meeting.

6. 51 Bus Rapid Transit
From: Councilmember Taplin (Author)
Referred: November 28, 2022
Due: June 21, 2023
Recommendation: 1) Refer to the City Manager the development of an implementation and community engagement plan to install Bus Rapid Transit, including dedicated bus lanes, transit signal priority, elevated platforms, and enhanced sections, on the AC Transit 51B route along University Avenue from Sixth Street to Shattuck Avenue and along Shattuck Avenue from University Avenue to Durant Avenue, with engagement centering pedestrian, cyclist, transit and mobility justice advocates, the disability rights community, local faith communities, merchants, neighboring residential communities inclusive of tenants, seniors, and students, and historically marginalized communities.
2) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along University Avenue from 6th Street to Oxford Street, consistent with the City of Berkeley's 2017 Bicycle Plan and integrating pedestrian amenities consistent with the City of Berkeley's 2020 Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the City of Berkeley General Plan's 2001 Transportation Element and the Alameda County Transportation Commission's (ACTC) 2016 Countywide Multimodal Arterial Plan.
3) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along Oxford Street from Virginia Street to Durant Avenue consistent with the Bicycle Plan and integrating pedestrian amenities consistent with the Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the Transportation Element and ACTC's Countywide Multimodal Arterial Plan. It will be coordinated with proposed improvements to transit performance on this Primary Transit Route, such as bus boarding islands, transit-only lanes, transit signal priority/queue jump lanes, far-side bus stop relocations, and other improvements as described in AC Transit's 2016 Major Corridor Study.
4) Refer $X to the Fiscal Year XX-XX Budget Process to install quick-build bus station improvements along the AC Transit 51B route.
5) Initiate consultation with AC Transit and UC Berkeley Bear Transit as soon as possible on the planning, scoping, and implementation of these items.
Financial Implications: See report
Contact: Terry Taplin, Councilmember, District 2, (510) 981-7120

Items for Future Agendas

- None

Adjournment

Action: M/S/C (Robinson/Harrison) to adjourn the meeting.
Vote: Ayes – Robinson, Harrison; Noes – None; Abstain – None; Absent – Taplin

Adjourned at 2:08 p.m.

I hereby certify that the foregoing is a true and correct record of the Facilities, Infrastructure, Transportation, Environment & Sustainability Committee meeting held on June 7, 2023.

____
Neetu Salwan, Assistant City Clerk

Communications

Communications submitted to City Council Policy Committees are on file in the City Clerk Department at 2180 Milvia Street, 1st Floor, Berkeley, CA, and are available upon request by contacting the City Clerk Department at (510) 981-6908 or policycommittee@cityofberkeley.info.

Kate Harrison
Councilmember District 4

ACTION CALENDAR
November 30, 2021

To: Honorable Mayor and Members of the City Council

From: Councilmember Harrison

Subject: Adopt an Ordinance Adding a New Chapter 12.01 to the Berkeley Municipal Code Establishing Emergency Greenhouse Gas Limits, Process for Updated Climate Action Plan, Monitoring, Evaluation, Reporting and Regional Collaboration

RECOMMENDATION

1. Adopt an ordinance adding a new Chapter 12.01 to the Berkeley Municipal Code (BMC) establishing Emergency Greenhouse Gas Limits with an effective date of [ ], 2022.

2. Refer to the FY23-24 Budget Process $[ ] consistent with implementing the requirements of Sections 12.01.040, 12.01.050, 12.01.060.

CURRENT SITUATION, EFFECTS, AND RATIONALE FOR RECOMMENDATION

Scientific evidence indicates that between the industrial period of 1850 and 2021, economic systems, namely state and free-market forms of capital accumulation and economic growth have increased global atmospheric carbon dioxide levels to a staggering 418 parts per million (ppm), beyond the established planetary boundary of 350 ppm, and warmed global average temperature by approximately 1.1 degrees Celsius. Available scientific evidence indicates there is no ‘safe’ level of warming beyond 350 ppm, only gradations of risk with respect to habitability.

Berkeley is already experiencing unprecedented negative effects of warming associated with 1 degree of warming, and current global growth trends and policies could push humanity past 1.5 degrees by mid-century, leading to a devastating 2-4 degrees by the end of the century. The ‘Global North,’ which includes Berkeley, has far exceeded its fair share of the emissions comprising and exceeding the boundary, and must reduce its emissions rapidly and justly.

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info

The City of Berkeley has engaged with the issue of global warming for at least three decades and has unquestionably been a leader in certain climate actions. Yet, in light of the current gravity of the climate emergency, current strategies and targets are not adequate. Exceptionally risky “mitigation” strategies, namely midcentury ‘net-zero’ pledges have provided for unbridled economic and emissions growth and thus severely dwindled carbon budgets, effectively rendering Berkeley’s gradual reduction goals: 80% by 2050 (Measure G, 2005 and Resolution 64,480-N.S., 2009) and net-zero by 2045 (Resolution 69,852–N.S., 2021), untenable. The majority of risk associated with each additional ton of greenhouse gas emitted will be borne by generations who will have not consented to current reduction goals and strategies. Current policies could exacerbate or lead to exceedingly dangerous new tipping points.

This item is timely in light of ongoing reports that national “pledges” under Paris Agreement could lead to at least 3 degrees of catastrophic warming, the inability for Congress to pass meaningful domestic and international climate policies and legislation, and the failure of world leaders to reach an effective and substantive agreement at the 26th UN Climate Change Conference of the Parties (COP26) in Glasgow.

BACKGROUND

The ordinance establishes emergency greenhouse gas limits aimed at reducing sector-based greenhouse gas emissions 90% below 2000 levels and consumption-based emissions 90% below 2013 levels by 2030. These limits would bring Berkeley closer to its global ‘fair share’ and science-based reduction obligations, and could help achieve reductions at scale as part of a program of regional coordination and collaboration.

While such targets are ambitious, mitigating and minimizing global warming risk and maximizing adaptation, resilience and adherence to planetary boundaries earlier in the century rather than later will likely result in less disruption to society over the long term, and will generate opportunities for more inclusive and sound democratic decision making as compared to waiting until atmospheric carbon levels reach increasingly catastrophic levels.

These limits are consistent with the City’s 2006 “precautionary principle” established by BMC 12.29, and which states:

> “The purpose of this chapter is to promote the health, safety, and general welfare of the community by minimizing health risks, improving air quality, protecting the quality of ground and surface water, minimizing consumption of resources, and minimizing the City’ s contribution to global climate change by implementing in a phased manner, as provided in this chapter, the City’s use of a precautionary principle approach in its decisions.”

As enacted by Council, BMC 12.29 requires the City to apply the following precautionary principle tenets in the course of action and decision-making:

1. Anticipatory Action: Anticipatory action may prevent harm. Government, business, community groups, and the public share this responsibility.

2. Right to Know: The community has a right to know complete and accurate information on potential health and environmental impacts associated with the selection of products, services, operations or plans.

3. Alternatives Assessment: Examine a full range of alternatives and select the alternative with the least potential impact on health and the environment including the alternative of doing nothing.

4. Consideration of Significant Costs: Consider significant short-term and long-term costs in comparing product alternatives, when feasible. This includes evaluation of significant costs expected during the lifetime of a product, (e.g. raw materials, manufacturing and production, transportation, use, clean-up, acquisition, extended warranties, operation, supplies, maintenance, disposal costs, long and short-term environmental and health impacts); and that expected lifetime compared to other alternatives.

5. Participatory Decision Process: Decisions applying the Precautionary Principle should be transparent, participatory by including community input, and informed by the best available information.

The ordinance requires the City to develop a new Climate Action Plan and consistent with these GHG limits and precautionary principle tenets, and to establish relevant legislative and budgetary timelines to help the City reach its objectives.

In addition, the ordinance requires the City to consider post-growth climate mitigation strategies and policies as potential alternatives to the growth and market-based and other policies that created the crisis and remain a persistent obstacle to meaningful action. The City’s policies and programs *must not* aim to merely increase economic growth for growth’s sake, but rather to support the provision of basic human needs and happiness.

It also provides an institutional framework to build solidarity with neighboring Bay Area communities and jurisdictions to achieve collective limits that could change rate of global warming while simultaneously providing sister cities in other countries precious time to improve living standards and pursue decarbonization.

<u>ENVIRONMENTAL SUSTAINABILITY</u>
This item is consistent with the latest climate science and the precautionary principle established by BMC 12.29.

<u>ATTACHMENTS</u>

1. Proposed Ordinance adding a new Chapter 12.01.

FINANCIAL IMPLICATIONS

Staff time will be necessary to implement the new ordinance. This item refers $[ ] to the FY23-24 Budget Process consistent with implementing the requirements of Sections 12.01.040, 12.01.050, 12.01.060.

CONTACT PERSON

Councilmember Kate Harrison, Council District 4, (510) 981-7140

ORDINANCE NO. –N.S.

ADDING CHAPTER 12.01 TO THE BERKELEY MUNICIPAL CODE TO ESTABLISH EMERGENCY GREENHOUSE GAS EMISSIONS LIMITS

BE IT ORDAINED by the Council of the City of Berkeley as follows:

Section 1. That Chapter 12.01 of the Berkeley Municipal Code is added to read as follows:

Chapter 12.01

EMERGENCY GREENHOUSE GAS EMISSIONS LIMITS

Sections:

12.01.010 Findings and purpose.

The Council of the City of Berkeley finds and declares as follows:

A. Available scientific evidence indicates that between the industrial period of 1850 and 2021 economic systems, namely state and free-market forms of capital accumulation and economic growth, have increased global atmospheric carbon dioxide levels to a staggering 418 parts per million (ppm) beyond the established planetary boundary of 350 ppm, and warmed global average temperature by approximately 1.1 degrees Celsius. The ‘Global North,’ which includes Berkeley, has far exceeded its fair share the emissions comprising and exceeding the boundary, and must reduce its emissions rapidly and equitably.

B. Available scientific evidence indicates there is no ‘safe’ level of warming beyond 350 ppm, only gradations of risk with respect to habitability. Berkeley, California, the United States, and the world is already experiencing unprecedented negative effects of warming associated with 1 degree of warming, and current global growth trends and policies will push humanity past 1.5 degrees as early as the 2030s and 3 to 4 degrees by the end of the century. Global warming between 1.5 to 2 degrees Celsius is expected to further accelerate existential risks to health and safety including but not limited to, extreme weather, mass extinction, water and food shortages, violent conflict, fire, forced migration, economic collapse, disease, heat stress, and sea level rise. The majority of risk associated with each additional ton of greenhouse gas emitted will be borne by generations who will have not consented to current reduction strategies.

C. In the twenty-first century, Berkeley, California, and the United States have largely and irresponsibly relied on ineffective market-based mechanisms, unrealistic expectations of absolutely decoupling GDP growth from energy use, speculative mass deployment of negative emission reduction technologies and ‘net-zero’ practices to offset continued fossil fuel production and consumption, and underappreciation of irreversible tipping points, aerosol masking, and non-carbon greenhouse gasses. In light of the current gravity of the climate emergency, these strategies have unequivocally failed; between Measure G and 2018, each jurisdiction only reduced greenhouse gasses by a respective 10%, 12%, and 26%, while at the same time globally, nearly a third of all anthropogenic carbon dioxide was emitted. Exceptionally risky strategies pursued by the Global North, namely midcentury ‘net-zero’ pledges have provided for unbridled economic and emissions growth and thus severely dwindled carbon budgets, effectively rendering Berkeley’s gradual reduction goals: 80% by 2050 (Measure G, 2005 and Resolution 64,480-N.S., 2009) and net-zero by 2045 (Resolution 69,852–N.S., 2021), untenable.

D. It is the intent of the Council to adopt stringent and equitable science-based greenhouse gas emissions limits and related action plans and reports, consistent with the precautionary principle approach established by Chapter 12.29, for the purpose of achieving the rapid, far-reaching, unprecedented and just changes in all aspects of society associated with mitigating and minimizing global warming risk and maximizing adaptation, resilience and adherence to planetary boundaries.

E. The Council further intends to endeavor to build solidarity with neighboring communities and jurisdictions to achieve collective limits that could change rate of global warming while simultaneously providing sister cities in other countries precious time to improve living standards and pursue decarbonization.

12.01.020 Definitions.
A. "Climate Action Plan" means the document required under Section 12.01 outlining the specific actions the City will endeavor to take to reduce Greenhouse gas emissions and to mitigation, resilience and adaptation efforts with respect to climate impacts.
B. “Consumption-Based Greenhouse Gas Emissions” means all the Greenhouse Gas emissions associated with producing, transporting, using, and disposing of products and services consumed by a particular community or entity in a given time period, including emissions generated outside the boundaries of the community or the geographic area where the entity is located.
C. “Greenhouse Gas” means any and all of the following gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride.
D. “Sector-Based Greenhouse Gas Emissions” means all of the Greenhouse Gas emissions generated within the geographic boundaries of the City in a given time period.
E. “Responsible Production and Consumption” means improving how materials and products are extracted, manufactured, delivered, acquired, used, reused, recycled, and disposed of to ensure that the production and consumption of materials and products promote basic human needs, are distributed in a socially equitable manner, and carried out in a way that minimizes environmental impacts over the lifecycle of those materials and products while matching the carrying capacity of the earth’s resources and adding value so as not to jeopardize present and future generations. “Lifecycle” means the complete material life of a product, good, or service, including resource extraction, manufacture, assembly, construction, maintenance, transportation, operations or use, and end of life (reuse, recycling/composting, and disposal). “Carrying capacity” means the number or amount of people, plants, and other living organisms that an ecosystem can support indefinitely without causing environmental degradation.
F. “Post-Growth Emissions Mitigation” means Greenhouse Gas mitigation strategies and policies that acknowledge and support the following:
(1) rapid emissions reductions may not be compatible with economic policies that support limitless growth, especially growth in the production and consumption of commodities that do not support basic human needs,
(2) in jurisdictions with high aggregate wealth there may be a disassociation between additional capital accumulation, economic growth, and GDP, and key social outcomes, to include but not limited to, health, social wellbeing, happiness and equity,
(3) fairer distribution of income and wealth, and guaranteed access to universal public services.

12.01.030 Emergency Greenhouse Gas Emissions Limits.
A. The following Greenhouse Gas emissions limits are hereby established:
(1) By 2030, reduce Sector-Based Greenhouse Gas Emissions [90%] below 2000 levels.
(2) By 2030, reduce Consumption-Based Greenhouse Gas Emissions to [5] mtCO2e per household or less, equivalent to a [90%] reduction compared to 2013 levels.
(3) By 2026, the Council shall determine an appropriate deadline for achieving 100% zero emissions across both Sector and Consumption-Based inventories.

12.01.040 Climate Action Plan.
A. By [ ], 2022, the City Manager or designee shall prepare and submit for relevant Council policy committee and Council approval a Climate Action Plan (CAP) which shall

do all of the following:
(1) Align with the emissions limits established in Section 12.01.030.
(2) Consider equitable Post-growth Climate Mitigation strategies and policies.
(3) Incorporate an equity framework that addresses historic racial, class-based, and social inequalities; prioritizes social, economic, and environmental benefits derived from implementing the CAP; and ensures an equitable distribution of those benefits. This framework shall consider:
(a) The engagement and prioritization of those who are most impacted by climate change and have historically had the least influence in decision-making processes, including low-income communities of color, communities with disabilities, and other impacted populations;
(b) Burdens and/or unintended consequences of related actions, especially for low-income communities of color, communities with disabilities, and other vulnerable populations; and
(c) Social interventions needed to secure workers' rights and livelihoods when economies are shifting to responsible production and consumption, collectively referred to as a “just transition” framework, and other impacts on workforce and job opportunities.
(4) Include, but not be limited to, the following elements: energy supply; transportation and land use; building operations; housing; Responsible Production and Consumption; carbon sequestration and water conservation.
(5) Identify strategies and/or make recommendations to achieve emissions limits for all elements. The CAP shall recommend approaches on goals and principles. Each strategy or recommendation shall:
(a) Identify parties responsible for implementation;
(b) Incorporate an estimated cost; and
(c) Incorporate estimated legislative and budgetary timelines based consistent with Section 12.01.030; and
(d) Contain key performance indicators and explicit equity metrics to measure progress.
B. The City Manager or their designee shall update the Climate Action Plan at least every two years.

12.01.050 Monitoring, Evaluation, And Reporting.
A. The City shall demonstrate its long-term commitment to reducing Greenhouse Gas emissions and advancing racial and social equity by measuring and reporting emissions, tracking key performance indicators and equity metrics, and monitoring the City’s progress on meeting its climate action goals and commitments.
B. The City Manager or their designee shall, with the assistance from relevant City agencies:
(1) Measure and monitor Sector-Based Greenhouse Gas Emissions, including municipal emissions, using best available global protocols for preparing Citywide Greenhouse Gas emission inventories.
(2) Measure production and consumption emissions using best available global methodologies for preparing consumption-based emission inventories.
(3) Evaluate Sector-Based Greenhouse Gas Emissions against set limits, document production and consumption emissions, and produce an annual Greenhouse Gas emissions report.
(4) Establish a monitoring and reporting process for the implementation of the CAP that:
(a) Tracks key performance indicators and equity metrics for strategies to help

monitor their progress and implementation;
(5) Request and receive data from City departments to support:
(a) The annual Greenhouse Gas emissions inventory. City departments may be asked to provide data on, but not limited to, the following: their energy use; types of fuels used for their operations; fuel volume; vehicle-miles travelled (if applicable) within their jurisdictions; and private sector Greenhouse Gas emission sources regulated by the department. Departments may also be requested to verify emission estimates and assumptions and review resulting reports;
(b) Monitoring and reporting of Climate Action Plan implementation. City departments may be asked to provide data on key performance indicators and equity metrics related to adopted strategies and actions; and
(6) Coordinate with other City agencies to monitor, track, and report on climate action progress to local, state, national, and global partners.
(7) Report its findings in a progress report to the Council and public every year.
(8) Report on at least a biannual basis to relevant Council policy committees and commissions to support policy and budget development consistent with reduction limits established in Section 12.01.030.

12.01.060 Regional Collaboration.
The Council and City staff, working alongside the public, shall endeavor to build solidarity and coalitions with neighboring communities, jurisdictions, and agencies to achieve equitable collective Greenhouse Gas limits and observe planetary boundaries.

11.63.070 Severability.
If any word, phrase, sentence, part, section, subsection, or other portion of this Chapter, or any application thereof to any person or circumstance is declared void, unconstitutional, or invalid for any reason, then such word, phrase, sentence, part, section, subsection, or other portion, or the prescribed application thereof, shall be severable, and the remaining provisions of this Chapter, and all applications thereof, not having been declared void, unconstitutional or invalid, shall remain in full force and effect. The City Council hereby declares that it would have passed this title, and each section, subsection, sentence, clause and phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses or phrases had been declared invalid or unconstitutional.

12.01.080 Construction.
This Chapter is intended to be a proper exercise of the City's police power, to operate only upon its own officers, agents, employees and facilities and other persons acting within its boundaries, and not to regulate inter-city or interstate commerce. It shall be construed in accordance with that intent.

12.01.090 Effective date.
The provisions in this ordinance are effective [ ], 2022.

Section 2. Copies of this Ordinance shall be posted for two days prior to adoption in the display case located near the walkway in front of the Maudelle Shirek Building, 2134 Martin Luther King Jr. Way. Within 15 days of adoption, copies of this Ordinance shall be filed at each branch of the Berkeley Public Library and the title shall be published in a newspaper of general circulation.

51 Bus Rapid Transit

Berkeley City Councilmember Terry Taplin District 2

Facilities, Infrastructure, Transportation, Environment, and Sustainability Policy Committee

March 2, 2023

RECOMMENDATION

- Refer to the City Manager the development of an implementation and community engagement plan to install Bus Rapid Transit, including dedicated bus lanes, transit signal priority, elevated platforms, and enhanced sections, on the AC Transit 51B route along University Avenue from Sixth Street to Shattuck Avenue and along Shattuck Avenue from University Avenue to Durant Avenue, with engagement centering pedestrian, cyclist, transit and mobility justice advocates, the disability rights community, local faith communities, merchants, neighboring residential communities inclusive of tenants, seniors, and students, and historically marginalized communities.

RECOMMENDATION

- Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along University Avenue from 6th Street to Oxford Street, consistent with the City of Berkeley's 2017 Bicycle Plan and integrating pedestrian amenities consistent with the City of Berkeley's 2020 Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the City of Berkeley General Plan's 2001 Transportation Element and the Alameda County Transportation Commission's (ACTC) 2016 Countywide Multimodal Arterial Plan.

RECOMMENDATION

- Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along Oxford Street from Virginia Street to Durant Avenue consistent with the Bicycle Plan and integrating pedestrian amenities consistent with the Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the Transportation Element and ACTC's Countywide Multimodal Arterial Plan. It will be coordinated with proposed improvements to transit performance on this Primary Transit Route, such as bus boarding islands, transit-only lanes, transit signal priority/queue jump lanes, far-side bus stop relocations, and other improvements as described in AC Transit's 2016 Major Corridor Study.

RECOMMENDATION

- Refer $X to the Fiscal Year XX-XX Budget Process to install quick-build bus station improvements along the AC Transit 51B route.

- Initiate consultation with AC Transit and UC Berkeley Bear Transit as soon as possible on the planning, scoping, and implementation of these items.

WHAT IS BUS RAPID TRANSIT (BRT)?

- AC Transit describes BRT as “a high-quality, high-capacity bus transit system designed to emulate light rail operation”
- AC Transit’s 2016 Major Corridors Study
- AC Transit’s 2018 Multimodal Corridor Guidelines

PERCENT TRAVEL SPEED AND RIDERSHIP

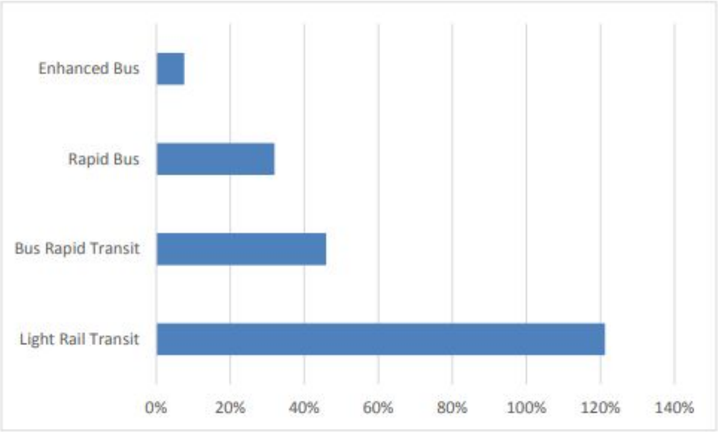


Figure A: Percent Travel Speed Increase by Mode (2040 with Project vs. 2040 Baseline)

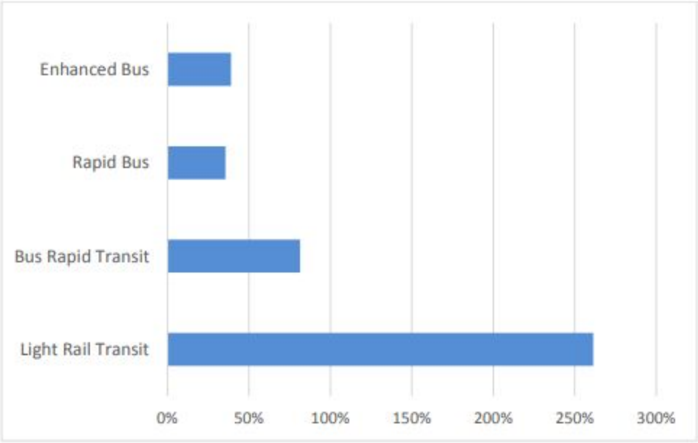


Figure B: Ridership Increase by Mode (2040 with Project vs. 2040 Baseline)

COST PER PASSENGER TRIP AND OPERATING COSTS

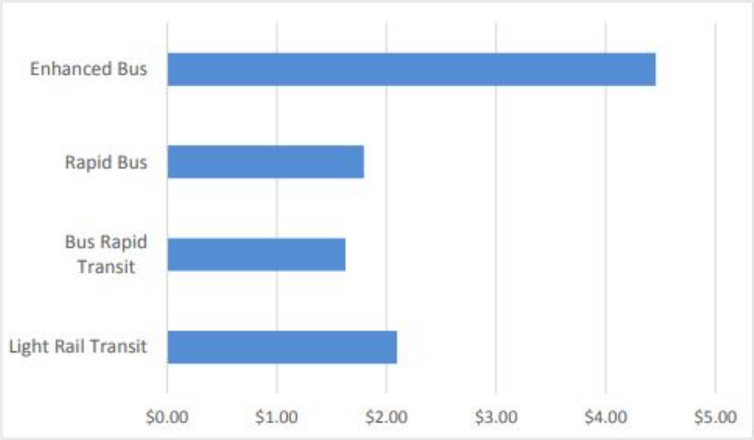


Figure D: Cost per Unlinked Passenger Trip by Mode

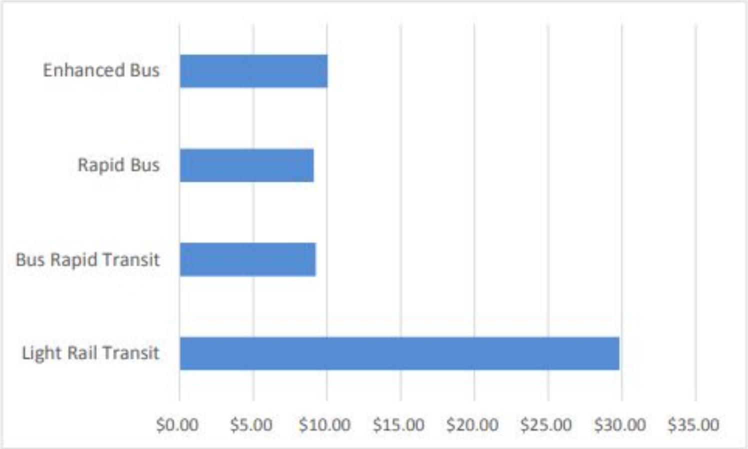


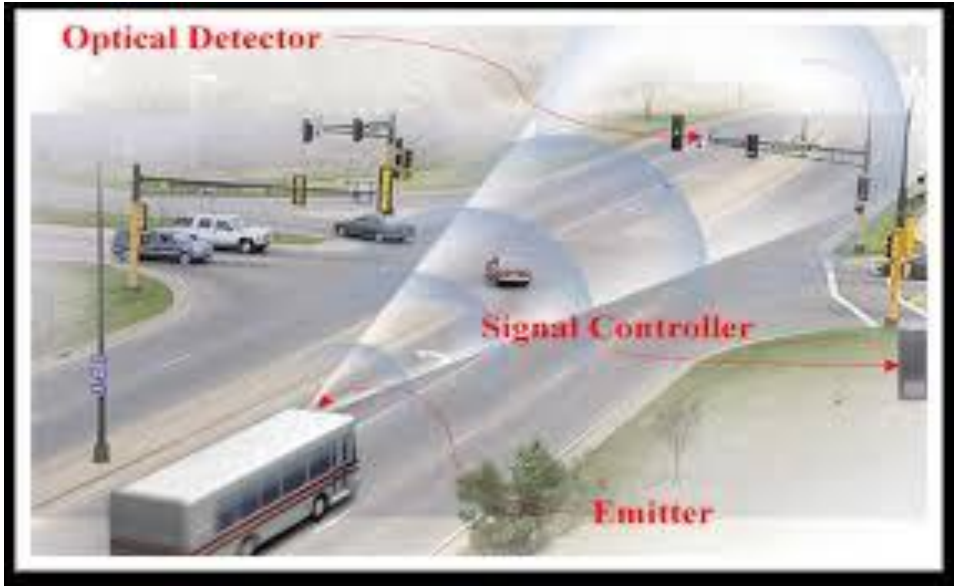
Figure E: Operating Cost per Mile by Mode

HIGH-AMENITY STATIONS AND OFF-BOARD FARES

Oakland

Oakland

PEDESTRIAN INFRASTRUCTURE AND TRANSIT SIGNALS



BUS-ONLY LANES

San Francisco

San Leandro

WHY BUS RAPID TRANSIT (BRT)?

- City of Berkeley's Climate Action Plan
- City of Berkeley's Strategic Transportation Plan
- City of Berkeley's Strategic Plan
- City of Berkeley's Vision Zero Action Plan
- Population Trends
- AC Transit Ridership
- Pedestrian Collisions
- ADA Compliance
- Local Business and Economy

CLIMATE ACTION PLAN (2009)

- Transportation Emissions Are Largest Source of Greenhouse Gases
- Envisions Public Transit, Walking, Cycling, and Other Sustainable Mobility Nodes as Primary Means of Transportation
- Goal: Increase Safety, Reliability, and Frequency of Public Transit
- Goal: Manage Parking Effectively to Minimize Driving Demand
- Goal: Encourage and Support Alternatives to Driving
- In 2018, City Declared Climate Emergency

STRATEGIC TRANSPORTATION PLAN (2016)

- Envisions Streets, Sidewalks, and Pathways as Multimodal
- Goal: Encouraging People to Walk, Bicycle, and Ride Transit
- Goal: Improve Transit Efficiency
- Goal: Design Street Networks That Ensure Comfortable, Safe Environments for Users of All Abilities
- Prioritizing Transit Services Along Transit Routes

STRATEGIC PLAN (2018)

- Goal: Provide State-of-the-Art, Well-Maintained Infrastructure, Amenities, and Facilities
- Goal: Create a Resilient, Safe, Connected, and Prepared City
- Goal: Foster a Dynamic, Sustainable, and Locally-Based Economy

VISION ZERO ACTION PLAN (2019)

- Strategy to Eliminate All Traffic Fatalities and Severe Injuries While Increasing Safe, Healthy, and Equitable Mobility for All
- Goal: Create Safer Transportation Options for People Who Walk, Bike, and Take Transit
    - Makes These Modes More Attractive
    - Reduces Number of Car Trips
    - Resulting in Fewer Severe and Fatal Collisions

POPULATION TRENDS

- City of Berkeley's 2023 Housing Element Update
- Since 2000, Population Has Increased 9% Each Decade
- 2020 Department of Finance Estimate: 122,580
- 2030 Association of Bay Area Government Estimate: 136,000
- 2040 Association of Bay Area Government Estimate: 141,000

AC TRANSIT RIDERSHIP

- 2019 Annual Report: Ridership Over 53 Million, 2.5% Increase from 2018
  - Key Factors: Proactive Efforts, Service Frequency, Robust Local Economy
  - Nationwide Major Transit Providers Reported 2.8% Decline
- 2020 COVID-19 Pandemic
  - Fewer People Commuting, Running Errands, or Doing Activities
  - Schools and Colleges Closed, Employees Working from Home
- Fiscal Year 2021-2022: Ridership Almost 29 Million, 36% Increase
  - Service at 85% of Pre-Pandemic Levels

PEDESTRIAN COLLISIONS

- City of Berkeley’s 2020 Pedestrian Plan
    - Shattuck and University Avenues Rank 1st and 5th (2008 - 2017)
    - 1st and 3rd (Tied) for Fatal or Severe

ADA COMPLIANCE

- BRT Improvements Advance City's Goals
  - Increasing Mobility Access for Transit Riders and Cyclists with Disabilities
  - ADA Accessibility Standards Issued by US Department of Transportation
  - Guidance for Bus Boarding and Alighting Areas, Shelters, Signs, and More

LOCAL BUSINESSES AND ECONOMY

- National Institute for Transportation and Communities
  - 2015 National Study of BRT Development Outcomes
  - Areas Within a ½ Mile of BRT Corridors Increased Share of Office Space By ⅓
  - New Multifamily Apartment Construction Doubled Since 2008
- PolicyLink "Business Impact Mitigations for Transit Projects" (2013)
  - Best Practices: Financial and Technical Assistance, Proactive Outreach

INITIAL CITY AND COMMUNITY INPUT

- City of Berkeley's Office of Economic Development
- District 2 Transportation and Infrastructure Commissioner
- AC Transit
- Bike East Bay
- Telegraph for People
- Walk Bike Berkeley

BUILDING COMMUNITY ENGAGEMENT

- Berkeley Chamber of Commerce
- Center for Independent Living
- Downtown Arts District
- Downtown Berkeley Association
- Netivot Shalom
- Poet’s Corner Merchants
- Telegraph for People
- University Avenue Association
- Walk Bike Berkeley
- Way Christian Center
- ...And More!

ONGOING CITY/AGENCY DISCUSSIONS

- AC Transit
- Alameda County Transportation Commission
- Berkeley Unified School District
- Fire Department
- Office of Economic Development
- Public Works Department
- Transportation Division
- Transportation and Infrastructure Commission
- UC Berkeley Bear Transit

QUESTIONS AND CONTACT INFORMATION

- Councilmember Terry Taplin
  - TTaplin@cityofberkeley.info
  - (510) 981-7120

- Rubén Hernández Story *(Chief of Staff)*
  - RHernandezStory@cityofberkeley.info
  - (510) 981-7120

BERKELEY CITY COUNCILMEMBER
TERRY TAPLIN
DISTRICT 2

CONSENT CALENDAR
March 2December 13, 20232

To: Honorable Mayor and Members of the City Council

From: Councilmember Terry Taplin (Author)

Subject: 51University-Downtown Avenue Bus Rapid Transit

RECOMMENDATION

(1) Refer to the City Manager and the Department of Public Works the installation initiation of a University Avenue Multimodal Corridor Project that centers the creation of a transit-only lane Bus Rapid Transit (BRT) corridor spanningalong University Avenue, Shattuck Avenue, and Telegraph Avenue with dedicated lanes and elevated platforms.
(2) Refer $300,000 to the budget process to be alloted to the Department of Public Worksengage a consultant for study, community engagement, and project design.for the study, community feedback process, and design of the project.
Refer $30,000 to the budget process for the construction of elevated bus stop platforms for the purposes of bringing BRTelevated platforms to University Avenue on a pilot basis while the wider project is in development.
initiate consultation with AC Transit and UC Berkeley Bear Transit as soon as possible on the planning, scoping and implementation of these items.

RECOMMENDATION

1) Refer to the City Manager the development of an implementation and community engagement plan to install Bus Rapid Transit, including dedicated bus lanes, transit signal priority, elevated platforms, and enhanced sections, on the AC Transit 51B route along University Avenue from Sixth Street to Shattuck Avenue and along Shattuck Avenue from University Avenue to Durant Avenue, with engagement centering pedestrian, cyclist, transit and mobility justice advocates, the disability rights community, local faith communities, merchants, neighboring residential communities inclusive of tenants, seniors, and students, and historically marginalized communities.Refer to the City Manager the development of an implementation and community engagement plan to install Bus Rapid Transit including dedicated bus lanes, transit signal priority, elevated platforms, and enhanced sections, along the AC Transit 51B route along University Ave from Sixth St to Shattuck Ave and along Shattuck Avenue from UniversitySixth to Durant, with engagement centering pedestrian, cyclist, transit and mobility justice advocates, the disability rights community, local faith communities, merchants,

neighboring residential communities inclusive of tenants, seniors, and students, and historically marginalized communities.

2) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along University Avenue from 6th Street to Oxford Street, consistent with the City of Berkeley's 2017 Bicycle Plan and integrating pedestrian amenities consistent with the City of Berkeley's 2020 Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the City of Berkeley General Plan's 2001 Transportation Element and the Alameda County Transportation Commission's (ACTC) 2016 Countywide Multimodal Arterial Plan.Refer $300k to the FY 24-25 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a two-cycle track along the University from 6th to Oxford consistent with the adopted 2017 Bicycle9 Bike Plan and integrating pedestrian amenities consistent with the Pedestrian Plan. As per the 2017 Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the Berkeley General Plan Transportation Element and the Alameda County Transportation Commission Countywide Multimodal Arterial Plan.

3) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along Oxford Street from Virginia Street to Durant Avenue consistent with the Bicycle Plan and integrating pedestrian amenities consistent with the Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the Transportation Element and ACTC's Countywide Multimodal Arterial Plan. It will be coordinated with proposed improvements to transit performance on this Primary Transit Route, such as bus boarding islands, transit-only lanes, transit signal priority/queue jump lanes, far-side bus stop relocations, and other improvements as described in AC Transit's 2016 Major Corridor Study.Refer $300k Refer $X to the FY 24-25 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a two-cycle track along Shattuck from Virginia to Woolsey consistent with the adopted 2017 Bicycle9 Bike Plan. and integrating pedestrian amenities consistent with the Pedestrian Plan. As per the 2017 Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the Berkeley General Plan Transportation Element and the Alameda County Transportation Commission Countywide Multimodal Arterial Plan. It will be coordinated with proposed improvements to transit performance on this Primary Transit Route, such as bus boarding islands, transit-only lanes, transit signal priority/queue jump lanes, far-side bus stop relocations, and other improvements as described in the AC Transit Major Corridor Study.

4) Refer $X to the Fiscal Year XX-XX Budget Process to install quick-build bus station improvements along the AC Transit 51B route.Refer to the FYx $X to install quick-build bus station improvements along the 51b route.

5) Initiate consultation with AC Transit and UC Berkeley Bear Transit as soon as possible on the planning, scoping, and implementation of these items.Iinitiate consultation with AC Transit and UC Berkeley Bear Transit as soon as possible on the planning, scoping, and implementation of these items.

FISCAL IMPACTS
Staff costs. An estimated $300,000 for the staff costs of engaging a consultant for the Multimodal Corridor Project. An estimated $30,000 for two elevated platforms, or “bus bulbs”, at an estimated cost of $15,000 per platform.[1]

BACKGROUNDCURRENT SITUATION AND ITS EFFECTS

Existing Transit Lanes**Existing Transit Lanes in Berkeley**
Currently, Berkeley has a transit lane on Bancroft Way between Telegraph and Downtown that is used by westbound buses, and a transit lane is planned for Durant Ave for eastbound buses. Bus lines using these lanes continue on to Shattuck, University, and Telegraph.

Shattuck, University, and Telegraph Avenues
Berkeley’s University Avenue runs West to East from the Berkeley Marina and I-80 Freeway to its termination at UC Berkeley’s Crescent Lawn. University Avenue is dubbed the “Gateway to Berkeley” due to the location of the city’s lone Amtrak Station at the intersection of Fourth Street, the avenue’s proximity to both the North Berkeley and Downtown Berkeley BART stations, the regularly congested I-80 exit onto the avenue, and the service of AC Transit’s 51B, 52, 79, 88, 802, and FS lines. University Avenue is a wide street with two travel lanes in each direction, parking lanes, turn pockets, and a center median.

Berkeley’s Shattuck Avenue runs North to South from Indian Rock Park in the Berkeley Hills to 45th Street in Oakland near the intersection of Telegraph Avenue. Shattuck Avenue serves as the main street of Berkeley, running through its Downtown, which is home to the Downtown Berkeley BART Station, AC Transit and Bear Transit stations, and various restaurants and office spaces.

Telegraph Avenue, from Woolsey Street on the Oakland border up through Dwight Way near UC Berkeley, is in the midst of its own Multimodal Corridor Project[2] that may result in BRT infrastructure in the coming years. Should this project be completed or significantly underway at the time of the development of BRT plans for Shattuck and University Avenues, close attention should be paid to its initial impacts, successes, and failures so that future applications of BRT infrastructure build on these lessons.

---

[1] https://berkeleyca.gov/sites/default/files/documents/2020%20Pedestrian%20Plan%20Appendix%20E%20%28adopted%29.pdf

[2] https://berkeleyca.gov/your-government/our-work/capital-projects/telegraph-avenue-multimodal-corridor-project#:~:text=The%20Telegraph%20Avenue%20Multimodal%20Corridor,bike%20lanes%2C%20and%20transit%20improvements.

University Avenue

Berkeley's University Avenue runs West to East from the Berkeley Marina and I-80 Freeway to its termination at the Crescent Lawn of the UC Berkeley campus. University Ave is dubbed the "Gateway to Berkeley" due to the location of the city's lone Amtrak Station at University & Fourth Street, the avenue's proximity to both the North Berkeley and Downtown Berkeley BART stations, the regularly congested I-80 exit onto the avenue, and the service of AC Transit's 51B, 52, 79, 88, 802, and FS lines on at least part of the corridor.. University Avenue is a wide street with two travel lanes in each direction, parking lanes, turn pockets, and a center median.

The central location of University Avenue and the variety of communities it connects makes this corridor an incredibly important focus for the City's housing and transportation planning for the coming decades. University Avenue has had a number of housing developments completed recently, with additional developments under construction, With University Avenue likely seeing a growth in new housing development under the forthcoming Housing Element, it is important for Berkeley's transportation infrastructure to keep up with the changing needs of its old and new residents. On top of the expected growth in Berkeley's population and thus its transportation needs, climate change and the urgency of pedestrian and cyclist safety require that the transportation system of the City's future be one that prioritizes public transit and bicycle travel over the use personal automobiles. With this in mind, the 2017 Bicycle Plan recommends a Complete Streets Corridor Study for University Avenue.[3]

Shattuck & Telegraph Avenues

Any successful transportation project that seeks to increase the speed and reliability of AC Transit service in Berkeley will need to serve a longer route have to apply to more than the a single relavivelyrelatively short corridor segmentjust one major within Berkeley. There are several transit corridors within Berkeley, and connecting to other cities, that AC Transit has identified as needing upgraded types of service. We It would be important for the City would like to work with the City AC Transit to identify the routings which would roadway. be the most productive.

Telegraph Avenue, running from the Oakland border in South-East Berkeley up through downtown to UC Berkeley, is in the midst of its own multimodal corridor project at this time that may result in rapid transit infrastructure on the avenue in the coming years.[4] Should the Telegraph Avenue Multimodal Project be completed or significantly underway at the time of the development of BRT plans for University Avenue and Shattuck Avenue, close attention should be paid to initiatial impacts, successes, and failures of the Telegraph project so that application of rapid transit infrastructure on University and Shattuck is done that builds on the lessons of Telegraph.

---

[3] https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Bicycle-Plan-2017_AppendixH_Complete%20Streets%20Corridors.pdf

[4] https://berkeleyca.gov/your-government/our-work/capital-projects/telegraph-avenue-multimodal-corridor-project#:~:text=The%20Telegraph%20Avenue%20Multimodal%20Corridor,bike%20lanes%2C%20and%20transit%20improvements.

Furthermore, these three avenues are each unique and each present their own problems when considering the addition of BRT. The application of BRT on the downtown stretch of Shattuck Avenue, which could improve the service of AC Transit's 18 and various other lines which briefly serve Shattuck at the start/end of their routes, will require careful consideration of the already congested conditions of the street. The construction of elevated platforms on University Avenue as a pilot for BRT while completion of Telegraph Avenue's project is underway and Shattuck Avenue rapid transit is being considered will allow for some near-term service improvements while giving staff the time necessary to study how to bring multimodal improvements to the rest of the corridors as fastidiously as possible.

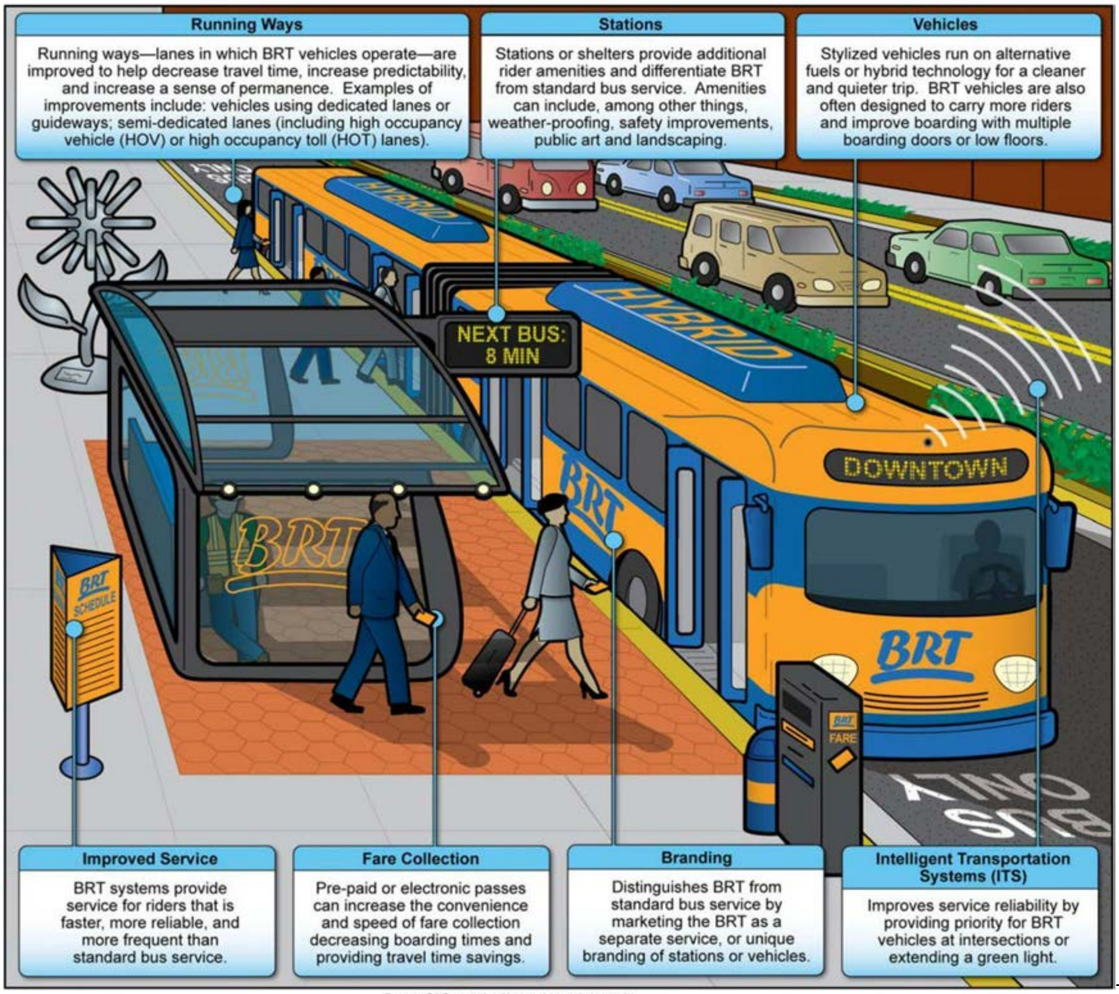
Bus Rapid Transit
While diverse in their application around the world, Bus Rapid Transit is typically a transportation corridor that prioritizes fast and efficient bus service that may include dedicated bus lanes, traffic signal priority, elevated platforms, and off-board fare collection.[5] There is no one-size-fits-all approach to BRT and a University Avenue BRT is sure to look different than it might on Telegraph Avenue or International Boulevard in Oakland. However, , but pursuit of a quicker and more efficient bus corridor along University should result in dedicated bus lanes and elevated platforms at existing AC Transit stops. Most transit planners consider center running bus lanes--such as provided on International Boulevard. aAnd Van Ness Avenue. iIn San Francisco--as more effective than curbside bus lanes. However, this would have to be determined in the course of planning the project. Relative to other rapid transit improvements such as light rail, BRT's advantages include lower upfront capital requirements, a higher degree of flexibility in their application, and a mucher quicker be implementation timeline.[6]

[5] https://www.transit.dot.gov/research-innovation/bus-rapid-transit
[6] https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=1023&context=jpt

Van Ness Avenue, San Francisco

~~*Do we want to include a photo? Van Ness Ave is probably the best example - it is designed to work with multiple existing bus lines using regular buses*~~

Figure 1: Characteristics of Bus Rapid Transit



Source: GAO analysis of bus rapid transit research. [7]

Population Trends

According to the City of Berkeley's 2023 Housing Element Update,[8] the city's population has grown steadily since 2000, increasing approximately 9% each decade. The Department of Finance estimates that the city's population was 122,580 in 2020. The Association of Bay Area Governments' Plan Bay Area 2040 projections anticipate Berkeley's population to reach about 136,000 by 2030 and 141,000 by 2040.

Pedestrian Collisions

The City of Berkeley's 2020 Pedestrian Plan[9] determined that Shattuck and University Avenues represent two of the top five streets with pedestrian collisions between 2008 and 2017, ranked first and fifth, respectively, as well as two of the top four streets with fatal or severe pedestrian collisions in the same time period, ranked first and third (tied) respectively.

---

[7] https://www.gao.gov/blog/2016/04/13/rapid-buses-for-rapid-transit

[8] https://berkeleyca.gov/sites/default/files/documents/Combined_HousingElementFinal_redline.pdf

[9] https://berkeleyca.gov/sites/default/files/2022-01/2020-Pedestrian-Plan.pdf

AC Transit

In AC Transit's 2019 Annual Report[10], they reported a systemwide ridership of over 53 million customers, reflecting a 2.5% increase (1.28 million riders) over the previous year. This occurred at a time when major transit providers nationwide reported a ridership decline of 2.8%. Key factors attributed to this growth included proactive efforts to maintain high service levels, adding service frequency, and a robust local economy. That same year, AC Transit released their first Strategic Plan[11] in about 20 years. In April of 2022, an Addendum[12] was added to address the effects of the ongoing COVID-19 pandemic.

The pandemic has had an enormous impact on transit operations and economic activity. In 2020, fewer people needed to ride the bus, whether to commute to work or get around the city for personal errands and activities. Schools and colleges closed their campuses and several office workers began working from home. Although there has been a recovery in ridership[13] beginning in 2021, pre-pandemic levels have not been reached. Fiscal Year 2021-2022 saw an annual ridership of almost 29 million customers, which was a 36% increase (7.6 million riders) over the previous fiscal year. Service is at around 85% of pre-pandemic levels, which is the equivalent of deleting one out of every seven trips.

RATIONALE

City of Berkeley Plans

The City of Berkeley's Climate Action Plan,[14] adopted in 2009, envisions public transit, walking, cycling, and other sustainable mobility modes as the primary means of transportation for residents and visitors. To do so, it lists various goals, such as increasing the safety, reliability, and frequency of public transit and managing parking effectively to minimize driving demand and encourage and support alternatives to driving. It also addresses the fact that transportation emissions are the largest source of greenhouse gas emissions, a trend that has continued as of the 2019 Greenhouse Gas Inventory.

The Berkeley Strategic Transportation Plan[15], adopted in 2016, envisions the city's streets, sidewalks, and pathways as multimodal, serving people walking, bicycling, riding transit, driving, and moving goods. To do so, it lists various goals, such as encouraging people to walk, bicycle, and ride transit, improving transit efficiency, designing street networks that ensure comfortable, safe environments for users of all abilities, and prioritizing transit services along transit routes.

---

[10] https://www.actransit.org/sites/default/files/2021-03/0017-20%20Annual%20Report%202019_small_FNL.pdf

[11] https://www.actransit.org/sites/default/files/2021-03/AC%20Transit%20Strategic%20Plan.pdf

[12] https://www.actransit.org/sites/default/files/2022-12/0230-22%20Strat%20Plan%20Adden_FNL.pdf

[13] https://www.actransit.org/ridership

[14] https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Climate-Action-Plan.pdf

[15] https://berkeleyca.gov/your-government/our-work/adopted-plans/berkeley-strategic-transportation-best-plan

The City of Berkeley's Strategic Plan[16], adopted in 2018, includes long-term goals such as providing state-of-the-art, well-maintained infrastructure, amenities, and facilities, creating a resilient, safe, connected, and prepared city, and fostering a dynamic, sustainable, and locally-based economy. That same year, the city declared a climate emergency and committed to mobilize to end greenhouse gas emissions swiftly.

The Berkeley Vision Zero Action Plan[17], adopted in 2019, is a strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. To do so, it lists various goals, such as creating safer transportation options for people who walk, bike, and take transit, which would make these modes more attractive and reduce the number of car trips in Berkeley, which can mean fewer severe and fatal collisions.

AC Transit's Recovery
Supporting AC Transit's recovery enhances the mobility and safety of Berkeley residents while simultaneously improving the walkability and bikeability of the city as well as breathing life into the local economy.

Any successful transportation project that seeks to increase the speed and reliability of AC Transit service in Berkeley will need to serve a longer route than the single relatively short corridor segment within Berkeley. There are several transit corridors within Berkeley connecting to other cities that AC Transit has identified as needing upgraded types of service. It would be important for the city to work with AC Transit to identify the routings which would be the most productive.

Shattuck, University, and Telegraph Avenues
The central location of University Avenue and the variety of communities it connects makes this corridor an incredibly important focus for the city's housing and transportation planning for the coming decades. University Avenue has had a number of housing developments completed recently, with additional developments under construction. With University Avenue likely seeing a growth in new housing development under the forthcoming Housing Element, it is important for Berkeley's transportation infrastructure to keep up with the changing needs of its old and new residents. On top of the expected growth in Berkeley's population and thus its transportation needs, climate change and the urgency of pedestrian and cyclist safety require that the transportation system of the City's future be one that prioritizes public transit and bicycle travel over the use personal automobiles. With this in mind, the 2017 Bicycle Plan recommends a Complete Streets Corridor Study for University Avenue.[18]

Furthermore, these three avenues are each unique and each present their own problems when considering the addition of BRT. The application of BRT on the downtown stretch of Shattuck Avenue, which could improve the service of AC Transit's

[16] https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Strategic-Plan.pdf
[17] https://berkeleyca.gov/sites/default/files/2022-02/Berkeley-Vision-Zero-Action-Plan.pdf
[18] https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Bicycle-Plan-2017_AppendixH_Complete%20Streets%20Corridors.pdf

18 and various other lines which briefly serve Shattuck Avenue at the start and end of their routes, will require careful consideration of the already congested conditions of the street. The construction of elevated platforms on University Avenue as a pilot for BRT while completion of Telegraph Avenue's project is underway and Shattuck Avenue rapid transit is being considered will allow for some near-term service improvements while giving staff the time necessary to study how to bring multimodal improvements to the rest of the corridors as fastidiously as possible.

Breakdown of Recommended Improvements

Dedicated bus lanes improve travel speeds and reliability by reducing delays caused by other traffic. Transit signal priority uses technology to reduce dwell time at traffic signals for transit vehicles, such as extending the duration of green lights or shortening that of red lights. Raised platforms make it easier and more accessible for passengers to board or alight from buses by decreasing the distance between the platform and the vehicle, therefore increasing route efficiency.

ADA Compliance

The recommended improvements also help advance the city's goal of increasing mobility access for transit riders and cyclists with disabilities. ADA Accessibility Standards for transportation facilities are issued by the US Department of Transportation and include guidance for bus boarding and alighting areas, shelters, signs, and more.[19]

Impact to Local Businesses and Economy

In addition to advancing various climate and public safety goals of the city, investing in bus and bicycle infrastructure benefits local businesses and the economy. The League of American Bicyclists's report entitled "Bicycling Benefits Business"[20] illustrates that the bicycle industry and its related transportation, tourism, and health benefits spur job creation, economic activity, and cost savings. The Outdoor Industry Association reported that outdoor recreation consumers spend $887 billion annually and create 7.6 million jobs.[21]

The National Institute for Transportation and Communities published a peer-reviewed study examining BRT lines and found that the areas within a half-mile of BRT corridors increased their share of new office space by one third from 2000-2007, and new multifamily apartment construction doubled in those half-mile areas since 2008.[22] PolicyLink released a report entitled "Business Impact Mitigations for Transit Projects"[23] that address BRT projects, concluding that best practices include providing the right

[19] https://federalist-e3fba26d-2806-4f02-bf0e-89c97cfba93c.app.cloud.gov/preview/atbcb/usab-uswds/ada-alternative/ada/#ada-810

[20] https://bikeleague.org/sites/default/files/Bicycling%20Benefits%20Business.pdf

[21] https://outdoorindustry.org/resource/2017-outdoor-recreation-economy-report/

[22] https://t4america.org/wp-content/uploads/2016/01/NATIONAL-STUDY-OF-BRT-DEVELOPMENT-OUTCOMES-11-30-15.pdf

[23] https://www.policylink.org/sites/default/files/FINAL%20PolicyLink%20Business%20Impact%20Mitigation%20Strategies_0.pdf

type of financial and technical assistance and proactive outreach to businesses built on constant communication, flexibility, and trust.

ENVIRONMENTAL IMPACTS

The City estimates that transportation-related emissions accounts for approximately 60% of our community's total annual greenhouse gas emissions.[24] By encouraging alternatives to car transportation by making public transportation options quicker and more appealing, policy stands to lower the emissions from our community's dominant source of carbon emissions.

The goal of any new public transportation initiative must be to increase the local mode eshare of residents choosing public transportation over personal automobiles for commuting and other trips.. BRT offers many advantages for this pursuit. The U.S. Government Accountability Office reviewed implemented BRT projects in 2012 and found that "13 of the 15 project sponsors…reported increases in ridership after 1 year of service and reduced average travel times of 10 to 35 percent over previous bus services."[25] Paired with the multimodal project along Telegraph Avenue, Berkeley has the potential for a large increase in transit ridership and thus a decline in greenhouse gas emissions if the City follows through on BRT in the coming years.

FISCAL IMPACTS

Staff costs. An estimated $300,000 for the staff costs of engaging a consultant for the Multimodal Corridor Project. An estimated $30,000 for two elevated platforms, or "bus bulbs", at an estimated cost of $15,000 per platform.[26]

CONTACT

Councilmember Terry Taplin, Councilmember, District 2, (510) 981-7120, TTaplin@cityofberkeley.info

ATTACHMENTS

1. AC Transit Multimodal Corridor Guidelines

[24] https://www.cityofberkeley.info/Clerk/City_Council/2018/12_Dec/Documents/2018-12-06_WS_Item_01_Climate_Action_Plan_Update_pdf.aspx
[25] https://www.gao.gov/products/gao-12-811
[26] https://berkeleyca.gov/sites/default/files/documents/2020%20Pedestrian%20Plan%20Appendix%20E%20%28adopted%29.pdf

BERKELEY CITY COUNCILMEMBER TERRY TAPLIN DISTRICT 2

CONSENT CALENDAR
March 2, 2023

To: Honorable Mayor and Members of the City Council

From: Councilmember Terry Taplin (Author)

Subject: 51 Bus Rapid Transit

RECOMMENDATION

1) Refer to the City Manager the development of an implementation and community engagement plan to install Bus Rapid Transit, including dedicated bus lanes, transit signal priority, elevated platforms, and enhanced sections, on the AC Transit 51B route along University Avenue from Sixth Street to Shattuck Avenue and along Shattuck Avenue from University Avenue to Durant Avenue, with engagement centering pedestrian, cyclist, transit and mobility justice advocates, the disability rights community, local faith communities, merchants, neighboring residential communities inclusive of tenants, seniors, and students, and historically marginalized communities.

2) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along University Avenue from 6th Street to Oxford Street, consistent with the City of Berkeley's 2017 Bicycle Plan and integrating pedestrian amenities consistent with the City of Berkeley's 2020 Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the City of Berkeley General Plan's 2001 Transportation Element and the Alameda County Transportation Commission's (ACTC) 2016 Countywide Multimodal Arterial Plan.

3) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along Oxford Street from Virginia Street to Durant Avenue consistent with the Bicycle Plan and integrating pedestrian amenities consistent with the Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the Transportation Element and ACTC's Countywide Multimodal Arterial Plan. It will be coordinated with proposed improvements to transit performance on this Primary Transit Route, such as bus boarding islands, transit-only lanes, transit signal priority/queue jump lanes, far-side bus stop relocations, and other improvements as described in AC Transit's

2016 Major Corridor Study.

4) Refer $X to the Fiscal Year XX-XX Budget Process to install quick-build bus station improvements along the AC Transit 51B route.

5) Initiate consultation with AC Transit and UC Berkeley Bear Transit as soon as possible on the planning, scoping, and implementation of these items.

BACKGROUND

Existing Transit Lanes

Currently, Berkeley has a transit lane on Bancroft Way between Telegraph and Downtown that is used by westbound buses, and a transit lane is planned for Durant Ave for eastbound buses. Bus lines using these lanes continue on to Shattuck, University, and Telegraph.

Shattuck, University, and Telegraph Avenues

Berkeley's University Avenue runs West to East from the Berkeley Marina and I-80 Freeway to its termination at UC Berkeley's Crescent Lawn. University Avenue is dubbed the "Gateway to Berkeley" due to the location of the city's lone Amtrak Station at the intersection of Fourth Street, the avenue's proximity to both the North Berkeley and Downtown Berkeley BART stations, the regularly congested I-80 exit onto the avenue, and the service of AC Transit's 51B, 52, 79, 88, 802, and FS lines. University Avenue is a wide street with two travel lanes in each direction, parking lanes, turn pockets, and a center median.

Berkeley's Shattuck Avenue runs North to South from Indian Rock Park in the Berkeley Hills to 45th Street in Oakland near the intersection of Telegraph Avenue. Shattuck Avenue serves as the main street of Berkeley, running through its Downtown, which is home to the Downtown Berkeley BART Station, AC Transit and Bear Transit stations, and various restaurants and office spaces.

Telegraph Avenue, from Woolsey Street on the Oakland border up through Dwight Way near UC Berkeley, is in the midst of its own Multimodal Corridor Project[1] that may result in BRT infrastructure in the coming years. Should this project be completed or significantly underway at the time of the development of BRT plans for Shattuck and University Avenues, close attention should be paid to its initial impacts, successes, and failures so that future applications of BRT infrastructure build on these lessons.

Bus Rapid Transit

While diverse in their application around the world, Bus Rapid Transit is typically a transportation corridor that prioritizes fast and efficient bus service that may include dedicated bus lanes, traffic signal priority, elevated platforms, and off-board fare

[1]https://berkeleyca.gov/your-government/our-work/capital-projects/telegraph-avenue-multimodal-corridor-project#:~:text=The%20Telegraph%20Avenue%20Multimodal%20Corridor,bike%20lanes%2C%20and%20transit%20improvements.

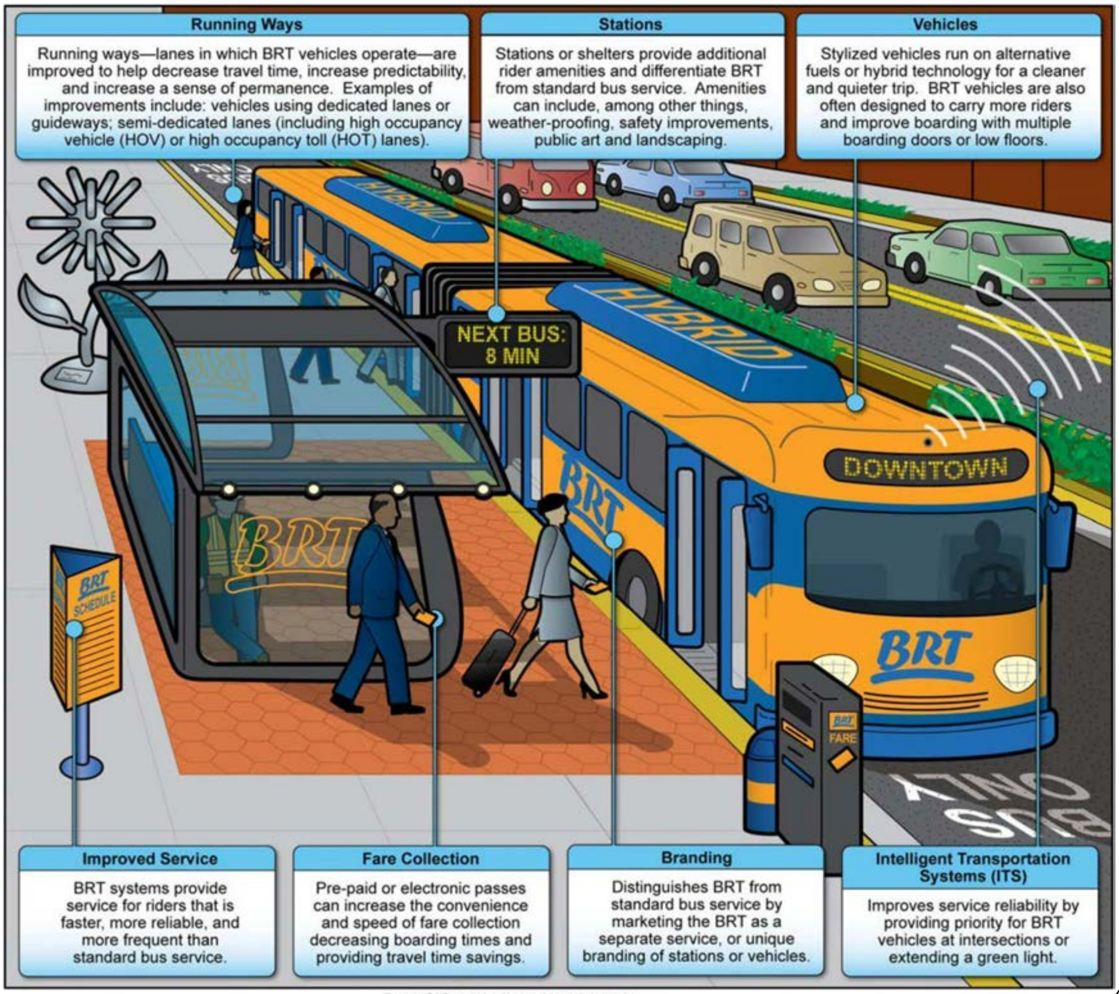
collection.[2] There is no one-size-fits-all approach to BRT and a University Avenue BRT is sure to look different than it might on Telegraph Avenue or International Boulevard in Oakland. However, pursuit of a quicker and more efficient bus corridor along University should result in dedicated bus lanes and elevated platforms at existing AC Transit stops. Most transit planners consider center running bus lanes--such as provided on International Boulevard and Van Ness Avenue in San Francisco--as more effective than curbside bus lanes. However, this would have to be determined in the course of planning the project. Relative to other rapid transit improvements such as light rail, BRT's advantages include lower upfront capital requirements, a higher degree of flexibility in their application, and a much quicker implementation timeline.[3]

Van Ness Avenue, San Francisco

[2] https://www.transit.dot.gov/research-innovation/bus-rapid-transit

[3] https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=1023&context=jpt

Figure 1: Characteristics of Bus Rapid Transit



Source: GAO analysis of bus rapid transit research. [4]

Population Trends

According to the City of Berkeley's 2023 Housing Element Update,[5] the city's population has grown steadily since 2000, increasing approximately 9% each decade. The Department of Finance estimates that the city's population was 122,580 in 2020. The Association of Bay Area Governments' Plan Bay Area 2040 projections anticipate Berkeley's population to reach about 136,000 by 2030 and 141,000 by 2040.

Pedestrian Collisions

The City of Berkeley's 2020 Pedestrian Plan[6] determined that Shattuck and University Avenues represent two of the top five streets with pedestrian collisions between 2008 and 2017, ranked first and fifth, respectively, as well as two of the top four streets with fatal or severe pedestrian collisions in the same time period, ranked first and third (tied) respectively.

---

[4] https://www.gao.gov/blog/2016/04/13/rapid-buses-for-rapid-transit

[5] https://berkeleyca.gov/sites/default/files/documents/Combined_HousingElementFinal_redline.pdf

[6] https://berkeleyca.gov/sites/default/files/2022-01/2020-Pedestrian-Plan.pdf

AC Transit
In AC Transit's 2019 Annual Report[7], they reported a systemwide ridership of over 53 million customers, reflecting a 2.5% increase (1.28 million riders) over the previous year. This occurred at a time when major transit providers nationwide reported a ridership decline of 2.8%. Key factors attributed to this growth included proactive efforts to maintain high service levels, adding service frequency, and a robust local economy. That same year, AC Transit released their first Strategic Plan[8] in about 20 years. In April of 2022, an Addendum[9] was added to address the effects of the ongoing COVID-19 pandemic.

The pandemic has had an enormous impact on transit operations and economic activity. In 2020, fewer people needed to ride the bus, whether to commute to work or get around the city for personal errands and activities. Schools and colleges closed their campuses and several office workers began working from home. Although there has been a recovery in ridership[10] beginning in 2021, pre-pandemic levels have not been reached. Fiscal Year 2021-2022 saw an annual ridership of almost 29 million customers, which was a 36% increase (7.6 million riders) over the previous fiscal year. Service is at around 85% of pre-pandemic levels, which is the equivalent of deleting one out of every seven trips.

<u>RATIONALE</u>

City of Berkeley Plans
The City of Berkeley's Climate Action Plan,[11] adopted in 2009, envisions public transit, walking, cycling, and other sustainable mobility modes as the primary means of transportation for residents and visitors. To do so, it lists various goals, such as increasing the safety, reliability, and frequency of public transit and managing parking effectively to minimize driving demand and encourage and support alternatives to driving. It also addresses the fact that transportation emissions are the largest source of greenhouse gas emissions, a trend that has continued as of the 2019 Greenhouse Gas Inventory.

The Berkeley Strategic Transportation Plan[12], adopted in 2016, envisions the city's streets, sidewalks, and pathways as multimodal, serving people walking, bicycling, riding transit, driving, and moving goods. To do so, it lists various goals, such as encouraging people to walk, bicycle, and ride transit, improving transit efficiency, designing street networks that ensure comfortable, safe environments for users of all abilities, and prioritizing transit services along transit routes.

---

[7]https://www.actransit.org/sites/default/files/2021-03/0017-20%20Annual%20Report%202019_small_FNL.pdf
[8]https://www.actransit.org/sites/default/files/2021-03/AC%20Transit%20Strategic%20Plan.pdf
[9]https://www.actransit.org/sites/default/files/2022-12/0230-22%20Strat%20Plan%20Adden_FNL.pdf
[10]https://www.actransit.org/ridership
[11]https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Climate-Action-Plan.pdf
[12]https://berkeleyca.gov/your-government/our-work/adopted-plans/berkeley-strategic-transportation-best-plan

The City of Berkeley's Strategic Plan[13], adopted in 2018, includes long-term goals such as providing state-of-the-art, well-maintained infrastructure, amenities, and facilities, creating a resilient, safe, connected, and prepared city, and fostering a dynamic, sustainable, and locally-based economy. That same year, the city declared a climate emergency and committed to mobilize to end greenhouse gas emissions swiftly.

The Berkeley Vision Zero Action Plan[14], adopted in 2019, is a strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. To do so, it lists various goals, such as creating safer transportation options for people who walk, bike, and take transit, which would make these modes more attractive and reduce the number of car trips in Berkeley, which can mean fewer severe and fatal collisions.

AC Transit's Recovery

Supporting AC Transit's recovery enhances the mobility and safety of Berkeley residents while simultaneously improving the walkability and bikeability of the city as well as breathing life into the local economy.

Any successful transportation project that seeks to increase the speed and reliability of AC Transit service in Berkeley will need to serve a longer route than the single relatively short corridor segment within Berkeley. There are several transit corridors within Berkeley connecting to other cities that AC Transit has identified as needing upgraded types of service. It would be important for the city to work with AC Transit to identify the routings which would be the most productive.

Shattuck, University, and Telegraph Avenues

The central location of University Avenue and the variety of communities it connects makes this corridor an incredibly important focus for the city's housing and transportation planning for the coming decades. University Avenue has had a number of housing developments completed recently, with additional developments under construction. With University Avenue likely seeing a growth in new housing development under the forthcoming Housing Element, it is important for Berkeley's transportation infrastructure to keep up with the changing needs of its old and new residents. On top of the expected growth in Berkeley's population and thus its transportation needs, climate change and the urgency of pedestrian and cyclist safety require that the transportation system of the City's future be one that prioritizes public transit and bicycle travel over the use personal automobiles. With this in mind, the 2017 Bicycle Plan recommends a Complete Streets Corridor Study for University Avenue.[15]

Furthermore, these three avenues are each unique and each present their own problems when considering the addition of BRT. The application of BRT on the downtown stretch of Shattuck Avenue, which could improve the service of AC Transit's

---

[13]https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Strategic-Plan.pdf

[14]https://berkeleyca.gov/sites/default/files/2022-02/Berkeley-Vision-Zero-Action-Plan.pdf

[15]https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Bicycle-Plan-2017_AppendixH_Complete%20Streets%20Corridors.pdf

18 and various other lines which briefly serve Shattuck Avenue at the start and end of their routes, will require careful consideration of the already congested conditions of the street. The construction of elevated platforms on University Avenue as a pilot for BRT while completion of Telegraph Avenue's project is underway and Shattuck Avenue rapid transit is being considered will allow for some near-term service improvements while giving staff the time necessary to study how to bring multimodal improvements to the rest of the corridors as fastidiously as possible.

Breakdown of Recommended Improvements

Dedicated bus lanes improve travel speeds and reliability by reducing delays caused by other traffic. Transit signal priority uses technology to reduce dwell time at traffic signals for transit vehicles, such as extending the duration of green lights or shortening that of red lights. Raised platforms make it easier and more accessible for passengers to board or alight from buses by decreasing the distance between the platform and the vehicle, therefore increasing route efficiency.

ADA Compliance

The recommended improvements also help advance the city's goal of increasing mobility access for transit riders and cyclists with disabilities. ADA Accessibility Standards for transportation facilities are issued by the US Department of Transportation and include guidance for bus boarding and alighting areas, shelters, signs, and more.[16]

Impact to Local Businesses and Economy

In addition to advancing various climate and public safety goals of the city, investing in bus and bicycle infrastructure benefits local businesses and the economy. The League of American Bicyclists's report entitled "Bicycling Benefits Business"[17] illustrates that the bicycle industry and its related transportation, tourism, and health benefits spur job creation, economic activity, and cost savings. The Outdoor Industry Association reported that outdoor recreation consumers spend $887 billion annually and create 7.6 million jobs.[18]

The National Institute for Transportation and Communities published a peer-reviewed study examining BRT lines and found that the areas within a half-mile of BRT corridors increased their share of new office space by one third from 2000-2007, and new multifamily apartment construction doubled in those half-mile areas since 2008.[19] PolicyLink released a report entitled "Business Impact Mitigations for Transit Projects"[20] that address BRT projects, concluding that best practices include providing the right

---

[16]https://federalist-e3fba26d-2806-4f02-bf0e-89c97cfba93c.app.cloud.gov/preview/atbcb/usab-uswds/ada-alternative/ada/#ada-810

[17]https://bikeleague.org/sites/default/files/Bicycling%20Benefits%20Business.pdf

[18]https://outdoorindustry.org/resource/2017-outdoor-recreation-economy-report/

[19]https://t4america.org/wp-content/uploads/2016/01/NATIONAL-STUDY-OF-BRT-DEVELOPMENT-OUTCOMES-11-30-15.pdf

[20]https://www.policylink.org/sites/default/files/FINAL%20PolicyLink%20Business%20Impact%20Mitigation%20Strategies_0.pdf

type of financial and technical assistance and proactive outreach to businesses built on constant communication, flexibility, and trust.

ENVIRONMENTAL IMPACTS

The City estimates that transportation-related emissions accounts for approximately 60% of our community's total annual greenhouse gas emissions.[21] By encouraging alternatives to car transportation by making public transportation options quicker and more appealing, policy stands to lower the emissions from our community's dominant source of carbon emissions.

The goal of any new public transportation initiative must be to increase the local mode share of residents choosing public transportation over personal automobiles for commuting and other trips.. BRT offers many advantages for this pursuit. The U.S. Government Accountability Office reviewed implemented BRT projects in 2012 and found that "13 of the 15 project sponsors…reported increases in ridership after 1 year of service and reduced average travel times of 10 to 35 percent over previous bus services."[22] Paired with the multimodal project along Telegraph Avenue, Berkeley has the potential for a large increase in transit ridership and thus a decline in greenhouse gas emissions if the City follows through on BRT in the coming years.

FISCAL IMPACTS

Staff costs. An estimated $300,000 for the staff costs of engaging a consultant for the Multimodal Corridor Project. An estimated $30,000 for two elevated platforms, or "bus bulbs", at an estimated cost of $15,000 per platform.[23]

CONTACT

Councilmember Terry Taplin, District 2, (510) 981-7120, TTaplin@cityofberkeley.info

ATTACHMENTS

1. AC Transit Multimodal Corridor Guidelines

[21] https://www.cityofberkeley.info/Clerk/City_Council/2018/12_Dec/Documents/2018-12-06_WS_Item_01_Climate_Action_Plan_Update_pdf.aspx
[22] https://www.gao.gov/products/gao-12-811
[23] https://berkeleyca.gov/sites/default/files/documents/2020%20Pedestrian%20Plan%20Appendix%20E%20%28adopted%29.pdf

BERKELEY CITY COUNCILMEMBER
TERRY TAPLIN
DISTRICT 2

CONSENT CALENDAR
March 2, 2023

To: Honorable Mayor and Members of the City Council

From: Councilmember Terry Taplin (Author)

Subject: 51 Bus Rapid Transit

RECOMMENDATION

1) Refer to the City Manager the development of an implementation and community engagement plan to install Bus Rapid Transit, including dedicated bus lanes, transit signal priority, elevated platforms, and enhanced sections, on the AC Transit 51B route along University Avenue from Sixth Street to Shattuck Avenue and along Shattuck Avenue from University Avenue to Durant Avenue, with engagement centering pedestrian, cyclist, transit and mobility justice advocates, the disability rights community, local faith communities, merchants, neighboring residential communities inclusive of tenants, seniors, and students, and historically marginalized communities.

2) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along University Avenue from 6th Street to Oxford Street, consistent with the City of Berkeley's 2017 Bicycle Plan and integrating pedestrian amenities consistent with the City of Berkeley's 2020 Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the City of Berkeley General Plan's 2001 Transportation Element and the Alameda County Transportation Commission's (ACTC) 2016 Countywide Multimodal Arterial Plan.

3) Refer $300,000 to the Fiscal Year 2024-2025 Budget Process to conduct a Complete Street Corridor Study antecedent to the installation of a cycle track along Oxford Street from Virginia Street to Durant Avenue consistent with the Bicycle Plan and integrating pedestrian amenities consistent with the Pedestrian Plan. As per the Bicycle Plan, the study will be evaluated in the context of the modal priorities established by the Transportation Element and ACTC's Countywide Multimodal Arterial Plan. It will be coordinated with proposed improvements to transit performance on this Primary Transit Route, such as bus boarding islands, transit-only lanes, transit signal priority/queue jump lanes, far-side bus stop relocations, and other improvements as described in AC Transit's

2016 Major Corridor Study.

4) Refer $X to the Fiscal Year XX-XX Budget Process to install quick-build bus station improvements along the AC Transit 51B route.

5) Initiate consultation with AC Transit and UC Berkeley Bear Transit as soon as possible on the planning, scoping, and implementation of these items.

BACKGROUND

Existing Transit Lanes

Currently, Berkeley has a transit lane on Bancroft Way between Telegraph and Downtown that is used by westbound buses, and a transit lane is planned for Durant Ave for eastbound buses. Bus lines using these lanes continue on to Shattuck, University, and Telegraph.

Shattuck, University, and Telegraph Avenues

Berkeley's University Avenue runs West to East from the Berkeley Marina and I-80 Freeway to its termination at UC Berkeley's Crescent Lawn. University Avenue is dubbed the "Gateway to Berkeley" due to the location of the city's lone Amtrak Station at the intersection of Fourth Street, the avenue's proximity to both the North Berkeley and Downtown Berkeley BART stations, the regularly congested I-80 exit onto the avenue, and the service of AC Transit's 51B, 52, 79, 88, 802, and FS lines. University Avenue is a wide street with two travel lanes in each direction, parking lanes, turn pockets, and a center median.

Berkeley's Shattuck Avenue runs North to South from Indian Rock Park in the Berkeley Hills to 45th Street in Oakland near the intersection of Telegraph Avenue. Shattuck Avenue serves as the main street of Berkeley, running through its Downtown, which is home to the Downtown Berkeley BART Station, AC Transit and Bear Transit stations, and various restaurants and office spaces.

Telegraph Avenue, from Woolsey Street on the Oakland border up through Dwight Way near UC Berkeley, is in the midst of its own Multimodal Corridor Project[1] that may result in BRT infrastructure in the coming years. Should this project be completed or significantly underway at the time of the development of BRT plans for Shattuck and University Avenues, close attention should be paid to its initial impacts, successes, and failures so that future applications of BRT infrastructure build on these lessons.

Bus Rapid Transit

While diverse in their application around the world, Bus Rapid Transit is typically a transportation corridor that prioritizes fast and efficient bus service that may include dedicated bus lanes, traffic signal priority, elevated platforms, and off-board fare

---

[1]https://berkeleyca.gov/your-government/our-work/capital-projects/telegraph-avenue-multimodal-corridor-project#:~:text=The%20Telegraph%20Avenue%20Multimodal%20Corridor,bike%20lanes%2C%20and%20transit%20improvements.

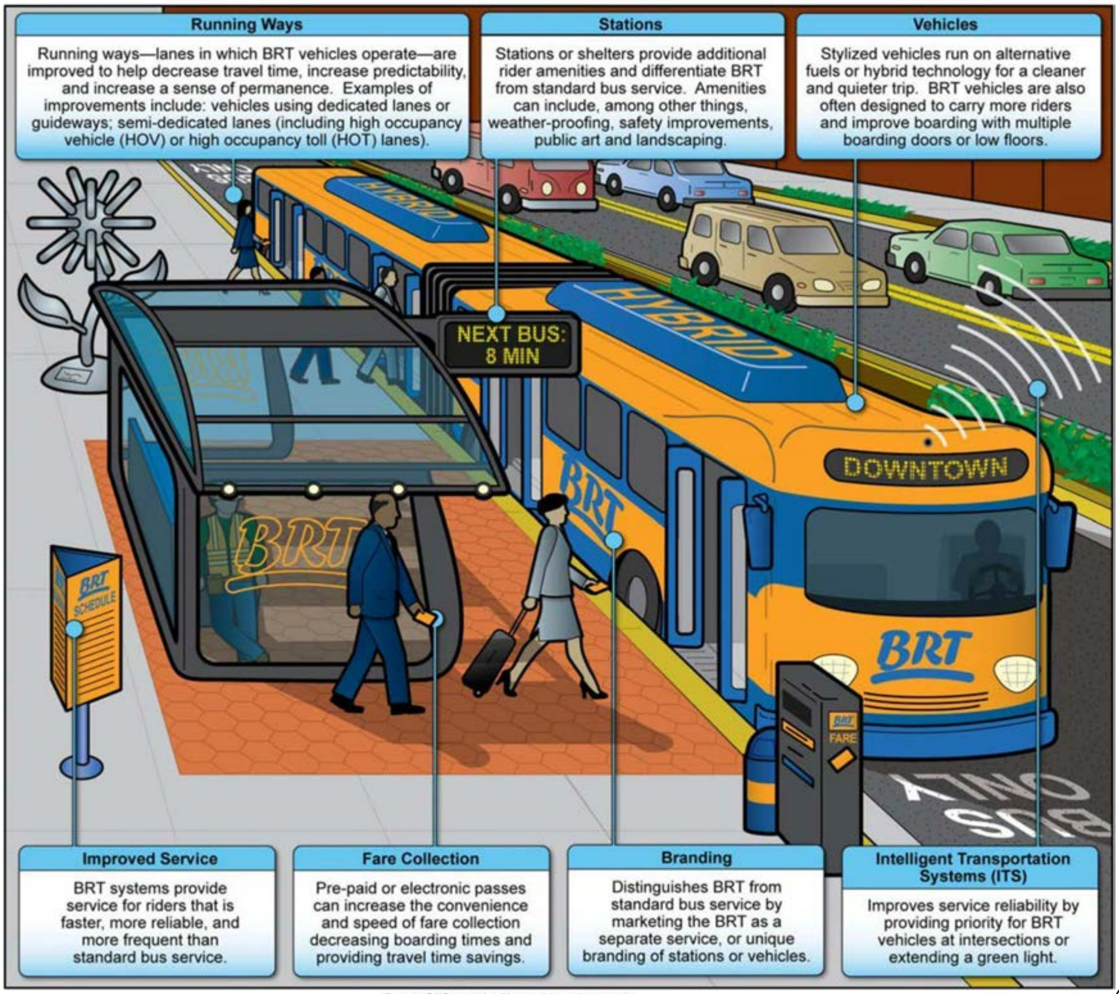
collection.[2] There is no one-size-fits-all approach to BRT and a University Avenue BRT is sure to look different than it might on Telegraph Avenue or International Boulevard in Oakland. However, pursuit of a quicker and more efficient bus corridor along University should result in dedicated bus lanes and elevated platforms at existing AC Transit stops. Most transit planners consider center running bus lanes--such as provided on International Boulevard and Van Ness Avenue in San Francisco--as more effective than curbside bus lanes. However, this would have to be determined in the course of planning the project. Relative to other rapid transit improvements such as light rail, BRT's advantages include lower upfront capital requirements, a higher degree of flexibility in their application, and a much quicker implementation timeline.[3]

Van Ness Avenue, San Francisco

[2] https://www.transit.dot.gov/research-innovation/bus-rapid-transit

[3] https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=1023&context=jpt

Figure 1: Characteristics of Bus Rapid Transit



Source: GAO analysis of bus rapid transit research. [4]

Population Trends
According to the City of Berkeley's 2023 Housing Element Update,[5] the city's population has grown steadily since 2000, increasing approximately 9% each decade. The Department of Finance estimates that the city's population was 122,580 in 2020. The Association of Bay Area Governments' Plan Bay Area 2040 projections anticipate Berkeley's population to reach about 136,000 by 2030 and 141,000 by 2040.

Pedestrian Collisions
The City of Berkeley's 2020 Pedestrian Plan[6] determined that Shattuck and University Avenues represent two of the top five streets with pedestrian collisions between 2008 and 2017, ranked first and fifth, respectively, as well as two of the top four streets with fatal or severe pedestrian collisions in the same time period, ranked first and third (tied) respectively.

---

[4] https://www.gao.gov/blog/2016/04/13/rapid-buses-for-rapid-transit

[5] https://berkeleyca.gov/sites/default/files/documents/Combined_HousingElementFinal_redline.pdf

[6] https://berkeleyca.gov/sites/default/files/2022-01/2020-Pedestrian-Plan.pdf

AC Transit

In AC Transit's 2019 Annual Report[7], they reported a systemwide ridership of over 53 million customers, reflecting a 2.5% increase (1.28 million riders) over the previous year. This occurred at a time when major transit providers nationwide reported a ridership decline of 2.8%. Key factors attributed to this growth included proactive efforts to maintain high service levels, adding service frequency, and a robust local economy. That same year, AC Transit released their first Strategic Plan[8] in about 20 years. In April of 2022, an Addendum[9] was added to address the effects of the ongoing COVID-19 pandemic.

The pandemic has had an enormous impact on transit operations and economic activity. In 2020, fewer people needed to ride the bus, whether to commute to work or get around the city for personal errands and activities. Schools and colleges closed their campuses and several office workers began working from home. Although there has been a recovery in ridership[10] beginning in 2021, pre-pandemic levels have not been reached. Fiscal Year 2021-2022 saw an annual ridership of almost 29 million customers, which was a 36% increase (7.6 million riders) over the previous fiscal year. Service is at around 85% of pre-pandemic levels, which is the equivalent of deleting one out of every seven trips.

<u>RATIONALE</u>

City of Berkeley Plans

The City of Berkeley's Climate Action Plan,[11] adopted in 2009, envisions public transit, walking, cycling, and other sustainable mobility modes as the primary means of transportation for residents and visitors. To do so, it lists various goals, such as increasing the safety, reliability, and frequency of public transit and managing parking effectively to minimize driving demand and encourage and support alternatives to driving. It also addresses the fact that transportation emissions are the largest source of greenhouse gas emissions, a trend that has continued as of the 2019 Greenhouse Gas Inventory.

The Berkeley Strategic Transportation Plan[12], adopted in 2016, envisions the city's streets, sidewalks, and pathways as multimodal, serving people walking, bicycling, riding transit, driving, and moving goods. To do so, it lists various goals, such as encouraging people to walk, bicycle, and ride transit, improving transit efficiency, designing street networks that ensure comfortable, safe environments for users of all abilities, and prioritizing transit services along transit routes.

---

[7]https://www.actransit.org/sites/default/files/2021-03/0017-20%20Annual%20Report%202019_small_FNL.pdf

[8]https://www.actransit.org/sites/default/files/2021-03/AC%20Transit%20Strategic%20Plan.pdf

[9]https://www.actransit.org/sites/default/files/2022-12/0230-22%20Strat%20Plan%20Adden_FNL.pdf

[10]https://www.actransit.org/ridership

[11]https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Climate-Action-Plan.pdf

[12]https://berkeleyca.gov/your-government/our-work/adopted-plans/berkeley-strategic-transportation-best-plan

The City of Berkeley's Strategic Plan[13], adopted in 2018, includes long-term goals such as providing state-of-the-art, well-maintained infrastructure, amenities, and facilities, creating a resilient, safe, connected, and prepared city, and fostering a dynamic, sustainable, and locally-based economy. That same year, the city declared a climate emergency and committed to mobilize to end greenhouse gas emissions swiftly.

The Berkeley Vision Zero Action Plan[14], adopted in 2019, is a strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. To do so, it lists various goals, such as creating safer transportation options for people who walk, bike, and take transit, which would make these modes more attractive and reduce the number of car trips in Berkeley, which can mean fewer severe and fatal collisions.

AC Transit's Recovery
Supporting AC Transit's recovery enhances the mobility and safety of Berkeley residents while simultaneously improving the walkability and bikeability of the city as well as breathing life into the local economy.

Any successful transportation project that seeks to increase the speed and reliability of AC Transit service in Berkeley will need to serve a longer route than the single relatively short corridor segment within Berkeley. There are several transit corridors within Berkeley connecting to other cities that AC Transit has identified as needing upgraded types of service. It would be important for the city to work with AC Transit to identify the routings which would be the most productive.

Shattuck, University, and Telegraph Avenues
The central location of University Avenue and the variety of communities it connects makes this corridor an incredibly important focus for the city's housing and transportation planning for the coming decades. University Avenue has had a number of housing developments completed recently, with additional developments under construction. With University Avenue likely seeing a growth in new housing development under the forthcoming Housing Element, it is important for Berkeley's transportation infrastructure to keep up with the changing needs of its old and new residents. On top of the expected growth in Berkeley's population and thus its transportation needs, climate change and the urgency of pedestrian and cyclist safety require that the transportation system of the City's future be one that prioritizes public transit and bicycle travel over the use personal automobiles. With this in mind, the 2017 Bicycle Plan recommends a Complete Streets Corridor Study for University Avenue.[15]

Furthermore, these three avenues are each unique and each present their own problems when considering the addition of BRT. The application of BRT on the downtown stretch of Shattuck Avenue, which could improve the service of AC Transit's

[13] https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Strategic-Plan.pdf
[14] https://berkeleyca.gov/sites/default/files/2022-02/Berkeley-Vision-Zero-Action-Plan.pdf
[15] https://berkeleyca.gov/sites/default/files/2022-01/Berkeley-Bicycle-Plan-2017_AppendixH_Complete%20Streets%20Corridors.pdf

18 and various other lines which briefly serve Shattuck Avenue at the start and end of their routes, will require careful consideration of the already congested conditions of the street. The construction of elevated platforms on University Avenue as a pilot for BRT while completion of Telegraph Avenue's project is underway and Shattuck Avenue rapid transit is being considered will allow for some near-term service improvements while giving staff the time necessary to study how to bring multimodal improvements to the rest of the corridors as fastidiously as possible.

Breakdown of Recommended Improvements

Dedicated bus lanes improve travel speeds and reliability by reducing delays caused by other traffic. Transit signal priority uses technology to reduce dwell time at traffic signals for transit vehicles, such as extending the duration of green lights or shortening that of red lights. Raised platforms make it easier and more accessible for passengers to board or alight from buses by decreasing the distance between the platform and the vehicle, therefore increasing route efficiency.

ADA Compliance

The recommended improvements also help advance the city's goal of increasing mobility access for transit riders and cyclists with disabilities. ADA Accessibility Standards for transportation facilities are issued by the US Department of Transportation and include guidance for bus boarding and alighting areas, shelters, signs, and more.[16]

Impact to Local Businesses and Economy

In addition to advancing various climate and public safety goals of the city, investing in bus and bicycle infrastructure benefits local businesses and the economy. The League of American Bicyclists's report entitled "Bicycling Benefits Business"[17] illustrates that the bicycle industry and its related transportation, tourism, and health benefits spur job creation, economic activity, and cost savings. The Outdoor Industry Association reported that outdoor recreation consumers spend $887 billion annually and create 7.6 million jobs.[18]

The National Institute for Transportation and Communities published a peer-reviewed study examining BRT lines and found that the areas within a half-mile of BRT corridors increased their share of new office space by one third from 2000-2007, and new multifamily apartment construction doubled in those half-mile areas since 2008.[19] PolicyLink released a report entitled "Business Impact Mitigations for Transit Projects"[20] that address BRT projects, concluding that best practices include providing the right

---

[16] https://federalist-e3fba26d-2806-4f02-bf0e-89c97cfba93c.app.cloud.gov/preview/atbcb/usab-uswds/ada-alternative/ada/#ada-810

[17] https://bikeleague.org/sites/default/files/Bicycling%20Benefits%20Business.pdf

[18] https://outdoorindustry.org/resource/2017-outdoor-recreation-economy-report/

[19] https://t4america.org/wp-content/uploads/2016/01/NATIONAL-STUDY-OF-BRT-DEVELOPMENT-OUTCOMES-11-30-15.pdf

[20] https://www.policylink.org/sites/default/files/FINAL%20PolicyLink%20Business%20Impact%20Mitigation%20Strategies_0.pdf

type of financial and technical assistance and proactive outreach to businesses built on constant communication, flexibility, and trust.

ENVIRONMENTAL IMPACTS

The City estimates that transportation-related emissions accounts for approximately 60% of our community's total annual greenhouse gas emissions.[21] By encouraging alternatives to car transportation by making public transportation options quicker and more appealing, policy stands to lower the emissions from our community's dominant source of carbon emissions.

The goal of any new public transportation initiative must be to increase the local mode share of residents choosing public transportation over personal automobiles for commuting and other trips.. BRT offers many advantages for this pursuit. The U.S. Government Accountability Office reviewed implemented BRT projects in 2012 and found that "13 of the 15 project sponsors…reported increases in ridership after 1 year of service and reduced average travel times of 10 to 35 percent over previous bus services."[22] Paired with the multimodal project along Telegraph Avenue, Berkeley has the potential for a large increase in transit ridership and thus a decline in greenhouse gas emissions if the City follows through on BRT in the coming years.

FISCAL IMPACTS

Staff costs. An estimated $300,000 for the staff costs of engaging a consultant for the Multimodal Corridor Project. An estimated $30,000 for two elevated platforms, or "bus bulbs", at an estimated cost of $15,000 per platform.[23]

CONTACT

Councilmember Terry Taplin, District 2, (510) 981-7120, TTaplin@cityofberkeley.info

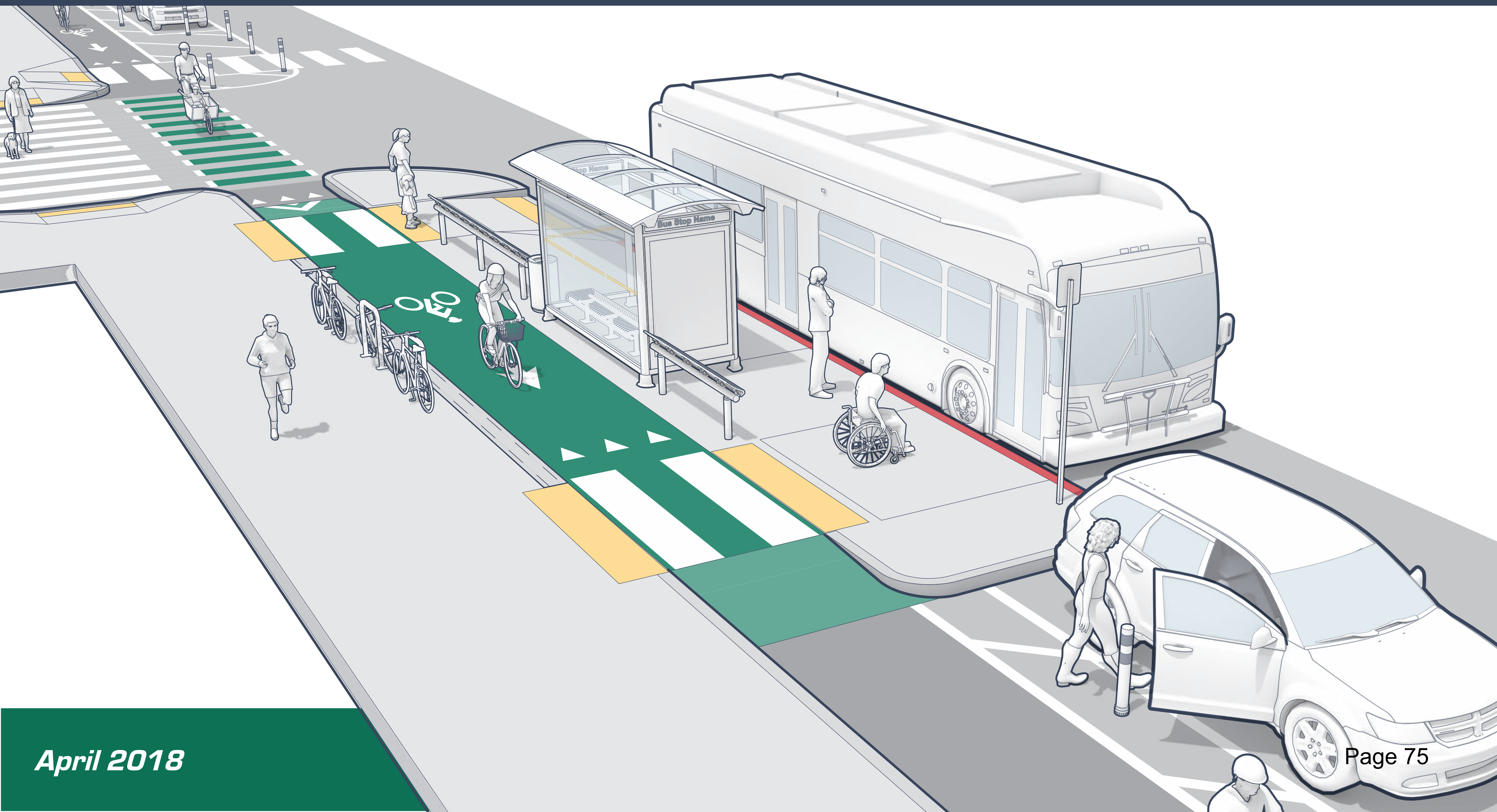
ATTACHMENTS

1. AC Transit Multimodal Corridor Guidelines

[21] https://www.cityofberkeley.info/Clerk/City_Council/2018/12_Dec/Documents/2018-12-06_WS_Item_01_Climate_Action_Plan_Update_pdf.aspx
[22] https://www.gao.gov/products/gao-12-811
[23] https://berkeleyca.gov/sites/default/files/documents/2020%20Pedestrian%20Plan%20Appendix%20E%20%28adopted%29.pdf

AC TRANSIT

Multimodal Corridor Guidelines



April 2018

Acknowledgments

Alameda-Contra Costa Transit District

John Urgo

Stephen Newhouse

Toole Design Group

Jesse Boudart, P.E.

Pete Robie

John Dempsey, PLA

Ashley Haire, Ph.D, P.E.

Stantec

Michael Ohnemus, AICP

Additional Experts

Sean Co

Table of Contents

Table of Contents

1.0
Guide Overview


Minneapolis, MN

Introduction

The AC Transit Multimodal Corridor Guidelines was developed to provide clear design standards for a range of typical roadway conditions to help ensure efficient transit operations, accommodate the needs of bicyclists, and facilitate safe access to and from bus stops for AC Transit passengers. This document offers guidance on design elements of bus stops adjacent to bicycle infrastructure. It is organized around five different typologies that vary based on the type of bicycle facility being considered and its location with respect to the curb, parking lane, and moving traffic. Ultimately, this guide will help create a more predictable, safe, and uniform experience for bus patrons, drivers, bicyclists, and pedestrians as they travel through the jurisdictions that comprise the Alameda-Contra Costa Transit District.

1.1 Goals of the Guide

A. Purpose

This guide has been developed to support the planning and design of bicycle facilities that will complement AC Transit's bus operations. AC Transit has set a goal to improve travel times and reliability on routes throughout its service area, especially on high-ridership corridors. The agency also seeks to promote safe pedestrian environments around its bus stops. This guide will help to establish a basis for collaboration on multimodal corridor projects with local jurisdiction staff and other stakeholders within the AC Transit service area. The guide draws from local, state, and national best practices guidance for multimodal corridor facilities while allowing for design flexibility to provide context-sensitive solutions.

The guide will address the following:

- **Americans with Disabilities Act (ADA) requirements for bus stop access, bus boarding, and sidewalk clearance outlined in the Designing with Transit handbook**
- **Spacing needs at bus stops for buses entering/exiting and clearance from crosswalks outlined in the Designing with Transit handbook**
- **Complementary designs for transit and bicycle facilities to ensure projects are integrated from the outset**
- **AC Transit's preference for in-lane bus stops and far-side bus stops in most scenarios**
- **Corridor typologies that reflect the various types of places present in the AC Transit service area**
- **Best practices for transit operations and accommodations for transit customers and bicyclists in existing designs and for innovative facilities such as separated bike lanes**
- **Methods to reduce conflicts among bicyclists, buses, and pedestrians to ensure safety while maintaining efficient operations**

Copenhagen, Denmark

- **Guidance for designing bicycle facilities to increase bicyclist comfort and encourage more people of all ages and abilities to ride bicycles**

The guide serves as AC Transit's official resource for planning and designing bus stops when accommodating bicycle facilities in transit corridors. The guide is intended to provide additional design guidance that supports existing planning and policy guidance published by the District. Therefore, this document should be used in conjunction with the Designing with Transit handbook and other approved policies or guidelines.

AC Transit hopes that this guide will serve as both an internal and external resource for local jurisdiction staff and developers when planning multimodal facilities and Complete Streets projects in the AC Transit service area. Complete Streets are generally defined as roadways built to enable safe travel for pedestrians, bicyclists, transit riders, and motorists. AC Transit will prioritize project support for projects that incorporate these design elements. These guidelines are a mechanism for AC Transit to clarify its roadway and curbside needs to stakeholders with the goal of streamlining the process of designing streets that support all modes.

B. Project Background

Multimodal corridors are major transportation facilities which accommodate auto, bus, bicycle and pedestrian travel. These corridors provide for travel across town and connect with the regional transportation system. Many cities and agencies in AC Transit's service area are expanding the reach of their multimodal corridors by designing and building innovative bicycle facilities along roadways. Many of these new bicycle facilities are built as Complete Streets projects which seek to enhance alternative modes of transportation, including bicycling, transit, and walking.

For cyclists, these new facilities can reduce the stress of riding a bicycle by providing physical separation from moving vehicles. However, there is an opportunity for Complete Streets designs to better address traditional bus transit operations. In the highly-constrained rights-of-way in Alameda and Contra Costa Counties, facilities such as separated bikeways, parking-protected bike lanes, or conventional bike lanes require reallocation of roadway space. This reallocation can be achieved by relocating or eliminating on-street parking and/or narrowing, realigning, or eliminating traffic lanes. In some cases, these changes have shifted the

Berkeley, CA

travel lanes used by buses further from the curbside where bus stops are commonly located, creating challenging and time-consuming maneuvers for bus operators to pull in and out of traffic. Furthermore, the roadway configuration can induce buses to move in and out of bicyclists' path of travel, which affects both bicyclist safety and bus operations (often referred to as a "leap-frogging" effect). With rates of bicycling increasing and jurisdictions rapidly constructing bicycle infrastructure, minimizing conflicts between bicycle and bus operations is critical to the success of these bikeway facilities. Efficiently managing and reallocating roadway space for these specific users will benefit all people using the streets.

Among many considerations, a multimodal corridor should include bicycle facilities that do not impinge on overall bus travel speeds, on-time performance, or safety. Bus stop designs can separate bicyclists from buses by routing bicyclists behind bus stops to avoid bus-bicyclist conflicts. Also, restricting motor vehicle turning movements, a component of some bicycle facility designs, can reduce delay to buses by minimizing motor vehicle conflicts and queues. Bicycle facility projects may also restrict on-street parking in select locations or along entire blocks, which could reduce the likelihood of cars encroaching into bus stops.

AC Transit recognizes that healthy communities require safe pedestrian and bicycle facilities and effective bus services, often in the same corridors. The Bay Area needs regionally-focused guidance that reflects current best practices in reducing conflicts at bus stops and along corridors, promoting pedestrian and bicyclist safety in coordination with bus operations, maintaining or improving transit operations, providing travel time predictability, and recognizing the local context where bicyclists and buses share roadway space. AC Transit's Multimodal Corridor Guidelines addresses this gap in guidance in multimodal corridor design by offering templates for bicycle facilities that are compatible with high-quality bus transit service.

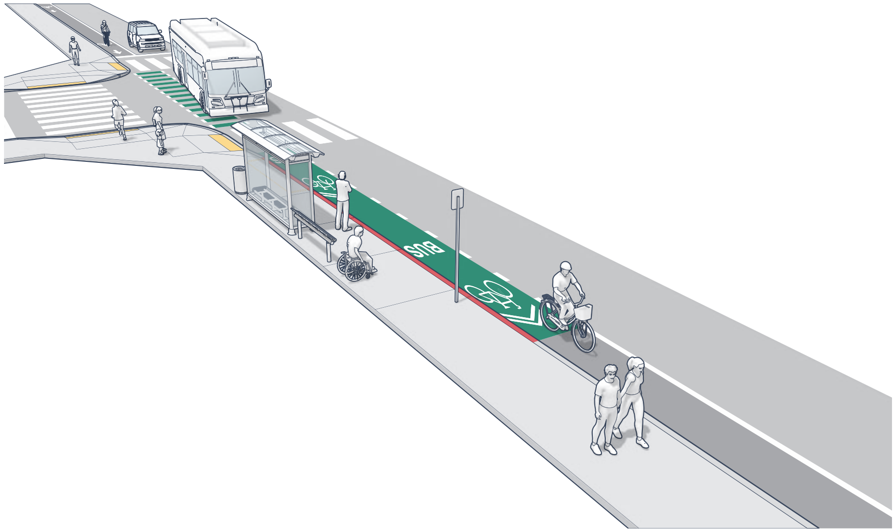
1.2 Guide Outline

The Multimodal Corridor Guidelines document is not a regulatory document. While much of the design guidance presented here represents best practices as published and endorsed by State and national agencies, the practices do not necessarily represent the adopted standards of these agencies. Therefore, users of these Guidelines should also consult regulatory standards such as the Caltrans *Highway Design Manual*[1] (for State facilities), the California *Manual on Uniform Traffic Control Devices*[2] (for State and local facilities), and any adopted local street design standards, to identify where design exceptions may apply.

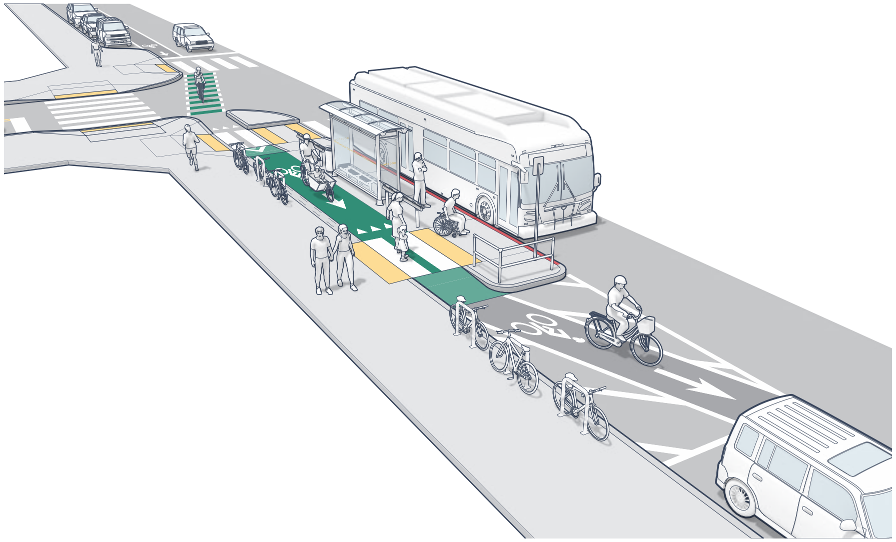
The guide begins with a discussion of general bus stop design elements related to stop spacing, location, design, and dimensions. A list of existing guidelines that may be referenced in conjunction with the Multimodal Corridor Guidelines is also presented.

Next, the guide presents five different bus stop typologies. These typologies vary based on the type of existing or proposed bicycle facility being located at the bus stop with respect to the curb, parking lane, and moving traffic. These bus stop typologies represent common contexts in the AC Transit service area. The five bus stop typologies are:

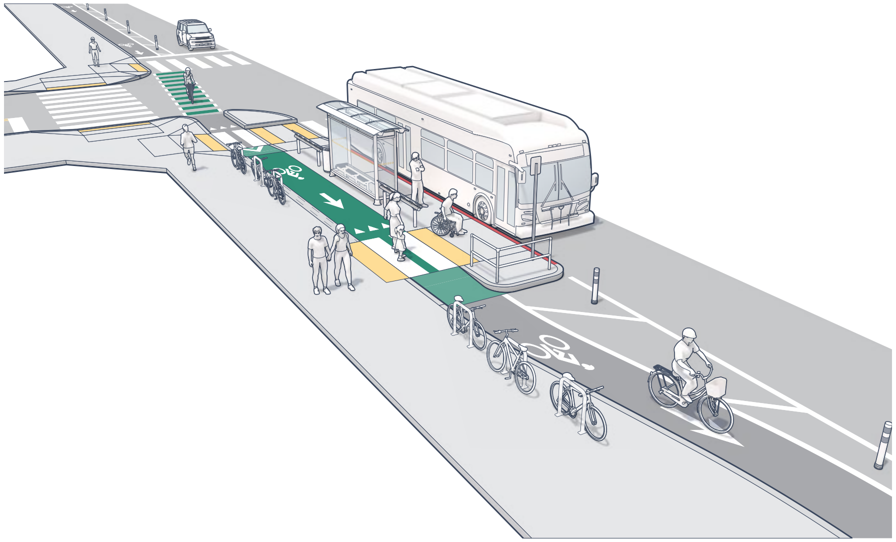
Typology 1
Class II Bicycle Facility between the Curb and a General Traffic Lane



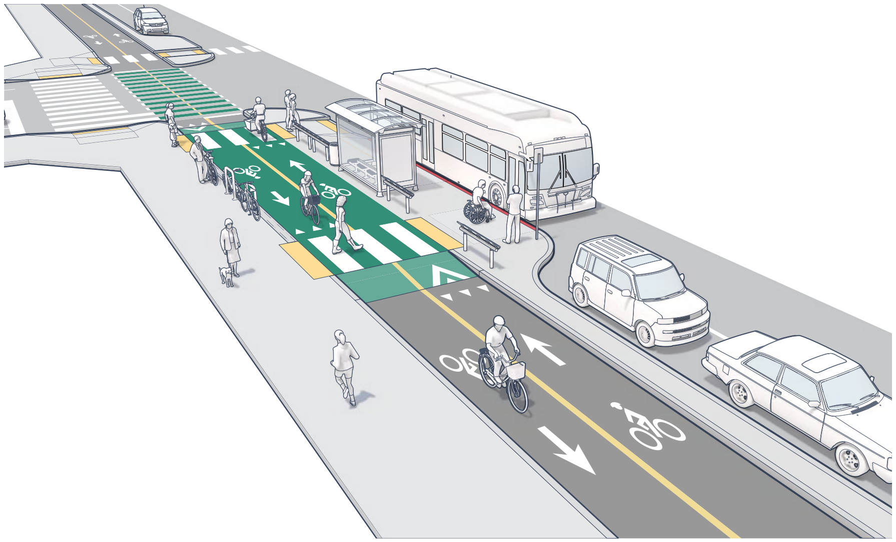
Typology 2
Class II Bicycle Facility between Curbside Parking Lane and General Traffic Lane



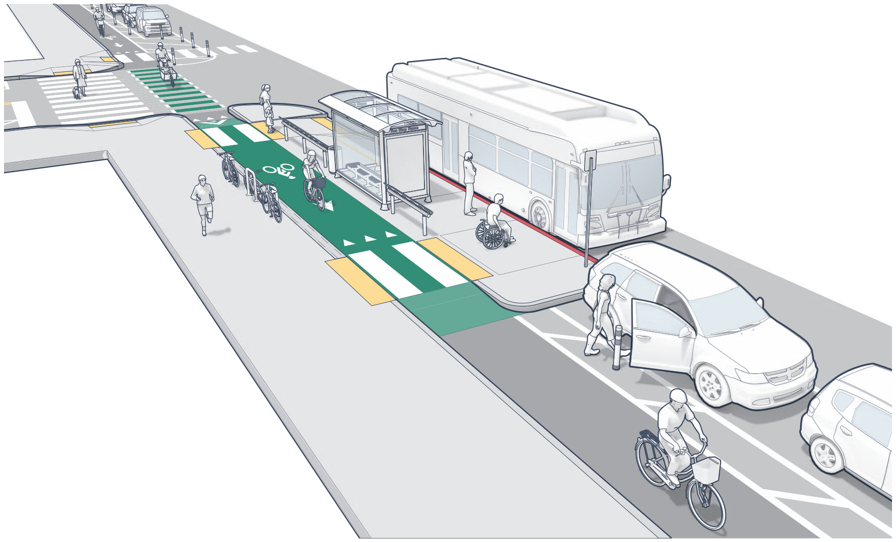
Typology 3
Class IV Bicycle Facility (Separated Bikeway) between the Curb and a General Traffic Lane



Typology 5
Class IV Bicycle Facility (Two-way Separated Bikeway) between the Curb and a Parking Lane



Typology 4
Class IV Bicycle Facility (Separated Bikeway) between the Curb and a Parking Lane



The guide concludes with a discussion on selecting the appropriate bus stop typology. Five guiding principles are presented to help jurisdictions understand the factors that should influence bus stop design and the relationships between these factors.

2.0
General Design Elements

Plainville, CT

The Guide supplements existing engineering practices and requirements to meet the goals of Complete Streets policies in the jurisdictions served by AC Transit. Design guidelines, standards, and other policies on Complete Streets, transit stops, and bikeways, have been published by local and national entities. In implementing the Guidelines, local agencies should consider any supporting documentation required to address existing local and State design standards. Ultimately, local agencies must evaluate, approve, and document design decisions.

Existing conditions in urban environments can be complex; design treatments must be tailored to the conditions present in individual contexts. Good engineering judgment based on comprehensive knowledge of multimodal transportation design, with special consideration to bicyclists, should be part of any multimodal design. Decisions should be thoroughly documented.

The following section (2.1) provides a summary of existing design guidelines that can be referenced when making planning and design decisions about local streets and roads. These resources provide a much wider breadth of information on designing Complete Streets, which fall outside the localized scope of this guidebook. Section 2.2 summarizes key elements of bus stop design, as they relate to the five bus stop typologies presented in this Guide.

2.1 Existing Guidelines

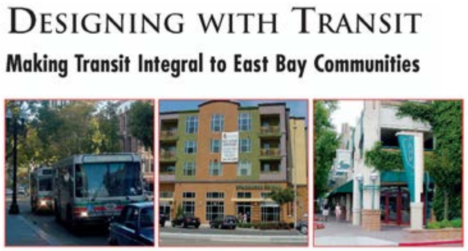
The following design guidelines, prepared by national and local bodies, are a selection of resources which closely relate to the Guide. These resources may be referenced in conjunction with the Guide when making planning and design decisions related to Complete Streets, bikeways, and transit.

AC Transit *Bus Stop Policy*

The AC Transit *Bus Stop Policy*[3] outlines the District's standards for bus stop spacing, bus stop location, bus stop enforcement, and bus stop installation or removal. Some of these policies are reiterated in the Guide.

AC Transit *Designing with Transit*

The *Designing with Transit*[4] handbook supports planning that is centered on transit access. The handbook is also intended to encourage multimodal transportation planning: planning and engineering which supports transit, walking, and bicycling, not just automobiles. The handbook is particularly focused on the often-overlooked needs and potential of bus transit, the most widely-used mode of transit. It outlines AC Transit's analysis of how the East Bay can be rebuilt in a more transit-friendly manner and aims to provide practical guidance about how these can be achieved through land use planning, development of pedestrian facilities, and traffic engineering.



Alameda CTC *Central County Complete Streets Design Guidelines*

The Alameda *Central County Complete Streets Design Guidelines*[5] document helps ensure that Central Alameda County street designs consider the full range of users on every street and accommodate all users wherever possible. While the goal of these design guidelines is to help staff from the three Central Alameda County jurisdictions (San Leandro, Hayward, and Alameda County) clearly understand how to implement Complete Streets for each street type, for different modal priorities, and for varying contexts, the design guidance provided can be applied by jurisdictions throughout Alameda and Contra Costa counties. The *Central County Complete Streets Design Guidelines* build on the street typology developed as part of the Alameda County Transportation Commission (Alameda CTC) Multimodal Arterial Plan (MAP).

Caltrans *Highway Design Manual*

Caltrans encourages local agencies to develop designs that help ensure the needs of non-motorized users in all products and project development activities, including programming, planning, construction, maintenance, and operations.

Design guidance for bikeway projects is provided in Chapters 100, 200, 300, and 1000 of the Caltrans *Highway Design Manual*. Alternatives to bikeway design guidance must meet the criteria outlined in Section 891 of the California Streets and Highways Code.

Projects within State right-of-way must refer to Caltrans standards and guidance, including but not limited to:

- **Caltrans *Highway Design Manual***
- **Design Information Bulletin, Separated Bikeways**
- **Design Information Bulletin, Caltrans ADA standards**

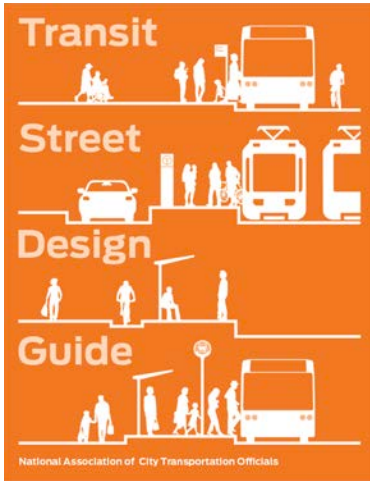
AASHTO *Guide for Development of Bicycle Facilities*

The AASHTO *Guide for the Development of Bicycle Facilities*[6] is the primary national reference for the planning and design of on-street bikeways and shared use paths. This guide represents AASHTO policy on bikeway planning and design, and addresses network planning principles, dimensions and treatments for bikeway design, and transitions between on-street bikeways and shared use paths. State DOTs and local jurisdictions often refer to this document when planning and designing bicycle facilities.

NACTO *Urban Street Design Guide*

A blueprint for designing 21st century streets, the NACTO *Urban Street Design Guide*[7] provides a toolbox and tactics for cities to use to make streets safer, more livable, and more economically vibrant. The guide outlines both a clear vision for Complete Streets and a basic road map for how to bring them to fruition. The guide focuses on the design of city streets and public spaces, emphasizing city street design as a unique practice with its own set of design goals, parameters, and tools.

NACTO *Transit Street Design Guide*



The NACTO *Transit Street Design Guide*[8] provides design guidance for the development of transit facilities on city streets, and for the design and engineering of city streets to prioritize transit, improve transit service quality, and support other goals related to transit. The guide sets a new vision for how cities can harness the immense potential of transit to create active and efficient streets in neighborhoods and downtowns alike.

NACTO *Urban Bikeway Design Guide*

The purpose of the NACTO *Urban Bikeway Design Guide*[9] is to provide cities with state-of-the-practice solutions that can help create Complete Streets that are safe and comfortable for bicyclists. The *Urban Bikeway Design Guide* addresses treatments not directly referenced in the AASHTO *Guide for the Development of Bicycle Facilities*, although they are virtually all (with two exceptions) permitted under the *Manual on Uniform Traffic Control Devices* (MUTCD)[10]. The Federal Highway Administration has posted information regarding MUTCD approval status of all the bicycle-related treatments in this guide.

2.2 Bus Stop Design

It is AC Transit's policy to encourage counties, cities, and developers to coordinate with AC Transit when locating bus stops on roadways. However, AC Transit does not own or maintain the bus stop areas, and the local jurisdiction can make the ultimate decision to site the bus stop.

When properly located, adequately designed, and effectively enforced, bus stops can improve service without disrupting general traffic flow. Decisions regarding bus stop spacing and location call for a careful analysis of passenger service requirements (demand, convenience, and safety), the type of bus service provided (local, rapid, Transbay/ express, or flexible service/community circulator), and the interaction of stopped buses with general traffic flow. The following sections summarize general bus stop design elements.

A. Bus Stop Spacing

Bus stops are designated locations for bus passengers to board and alight. Therefore, bus stops must be conveniently located to enable easy passenger access. Convenience and speed must be balanced in determining appropriate bus stop placement, as too many bus stops can slow down travel times. Outside of downtown areas, the ideal spacing of bus stops is 1,000 feet apart. This target has been established with the goal of increasing travel speed for AC Transit buses, and means that some existing stops may be eliminated. Passenger usage of bus stops is an important factor when considering bus stop placement or removal.

Bus stops should be close enough that passengers can walk to them easily, but far enough apart to help buses move quickly. Table 1 provides general guidelines for bus stop spacing. Some discretion may be applied when balancing AC Transit's interest in improving service and preserving traffic flow with consideration of passenger needs.

Service Type	Spacing (feet)	Explanation
Local (trunk, feeder, etc.)	800-1,300 feet	Stops may be located more closely than listed based on trip attractors, stop activity or demand, transfer points or other land uses that may warrant it.
Rapid	1,700-5,000 feet	Stops may be located more closely than listed based on trip attractors, stop activity or demand, transfer points or other land uses that may warrant it provided that the increased stops do not cause operational delays
Transbay/ Express	1,000-2,600 feet	Service may use local stops as necessary to provide geographic coverage and to minimize delay for longer-distance passengers.
Flexible or Community Circulator	TBD	Stops would be determined on a route by route basis and would consider trip attractors, transfer areas or other factors.

Table 1: AC Transit Bus Stop Spacing Guidelines (AC Transit Policy No. 508)

Table 1 lists AC Transit's intended bus stop spacing for the four different Service Types. It is AC Transit's preference to use the maximum bus stop spacing unless superseded by other determining factors such as topography (hills), limited access areas (freeways, bridges, airports), surrounding attractors, and transfer points. As a result, existing AC Transit routes may have stops that do not conform to the spacing criteria in this policy.

B. Bus Stop Siting

The optimal stop location should improve or minimize impact to bus travel times, maximize reliability and route efficiency, and be safe and accessible, while maintaining or enhancing bus passenger access to destinations and amenities. The siting of a bus stop not only impacts transit passengers, but also motorists, pedestrians, and bicyclists near the stop.

Multiple factors are used to determine the appropriate siting of a bus stop including:

Demographics and Land Use

Ridership – Assess both existing and projected boardings and alightings, as well as the ridership profile (for example, a large proportion of seniors or students) at the stop. Low-ridership stops, particularly those near higher-ridership stops, may be considered for consolidation or removal. The threshold for a low-ridership stop will be determined by comparing its ridership to that at other stops along the route, or by comparing with a similar bus route, while also considering the frequency of service provided at the stop.

Existing and Future Land Uses – Note sensitive land uses, including medical facilities, municipal buildings, senior housing, and major transit trip generators such as shopping malls, schools, and dense commercial or residential complexes. Stop locations may be adjusted or added to provide better access to passenger origins and destinations, although this determination will also be dependent on pedestrian connections and conditions.


Seattle, WA

Existing Service and Passenger Amenities

Bus Route Connections – Consideration should be given to maintaining and/or improving bus stops serving parallel or intersecting bus routes. Under certain circumstances, the relocation of an existing bus stop may be necessary, and doing so may increase the access distance for passengers transferring between intersecting routes. Priority should be given to relocating the stop in close proximity of its former location, thereby minimizing the additional distance a transferring passenger would have to walk between stops.

Passenger Amenities – Evaluate opportunities to add amenities to new or existing stops and maintain or upgrade amenities at existing stops. Many bus stop amenities are justified by high ridership and a desire to improve passenger comfort. Implementation of amenities such as lighting or real-time arrival displays may require a nearby power source or solar panels.

Pedestrian Environment

Connections and Condition – Sidewalks immediately at the stop and those providing access to the stop and surrounding area are an important consideration. When choosing a site to establish or relocate a stop, choose the widest, most level sidewalk near the desired location. Stops should also be located to maximize ridership. A designer will need to balance the demands of pedestrian connections and bus ridership.

Crossings – Where bus stops are located near pedestrian crossings, the crossing should be marked and preferably located behind the stop, so that passengers are encouraged to cross behind the bus. Ideally, crossings should be signalized, especially in high-traffic and high-speed environments. Intersections and at-grade driveway crossings should have ADA-compliant curb ramps.

Safety and Bus Stop Visibility

Lighting – Lighting should be provided at stops for the safety and security of bus patrons. Bus stop lighting simultaneously offers bus operators better visibility of waiting passengers. Lighting can be cast by pedestrian-scale light fixtures, lighted shelters, overhead street lights, or brightly-lit signs.

Sight Distance – Consider sight distance for transit passengers, bus operators, and other motorists. Avoid obstructions to sightlines between bus operators and passengers such as trees, signs, buildings, shelters, and topography.

For optimal sight distance between bus operators and other motorists, bus stops should not be located over the crest of a hill, immediately in or after a roadway curve to the right, or at locations that might reduce visibility between buses and other vehicles.

Speed Limit (MPH)	Sight Distance (feet)
15	200
20	265
25	335
30	400
35	465
40	530
45	600
50	665

Table 2: Sight Distance for Siting Bus Stops

Adapted from AASHTO 2016 and AASHTO 2011.
Note: Assume a 9-second time gap is required for buses to re-enter traffic without undue interference to traffic flow.

Approaching vehicles need to have adequate visibility of stopped buses and buses entering or exiting a stop, particularly when stops are located in the travel lane. Similarly, bus drivers need to be able to see vehicles approaching from behind when exiting a stop. Table 2 provides the recommended sight distance for bus stops, given the posted speed limit. At a minimum, bus stops should be sited to meet the minimum stopping sight distance provided by AASHTO.

It is not recommended to place stops where there is inadequate sight distance, and existing stops with poor visibility should be considered for relocation or removal. In addition, stopped buses can impact sight distance for vehicles exiting side streets. Depending on the location of the stop relative to an intersection, different vehicular turn movements can be affected.

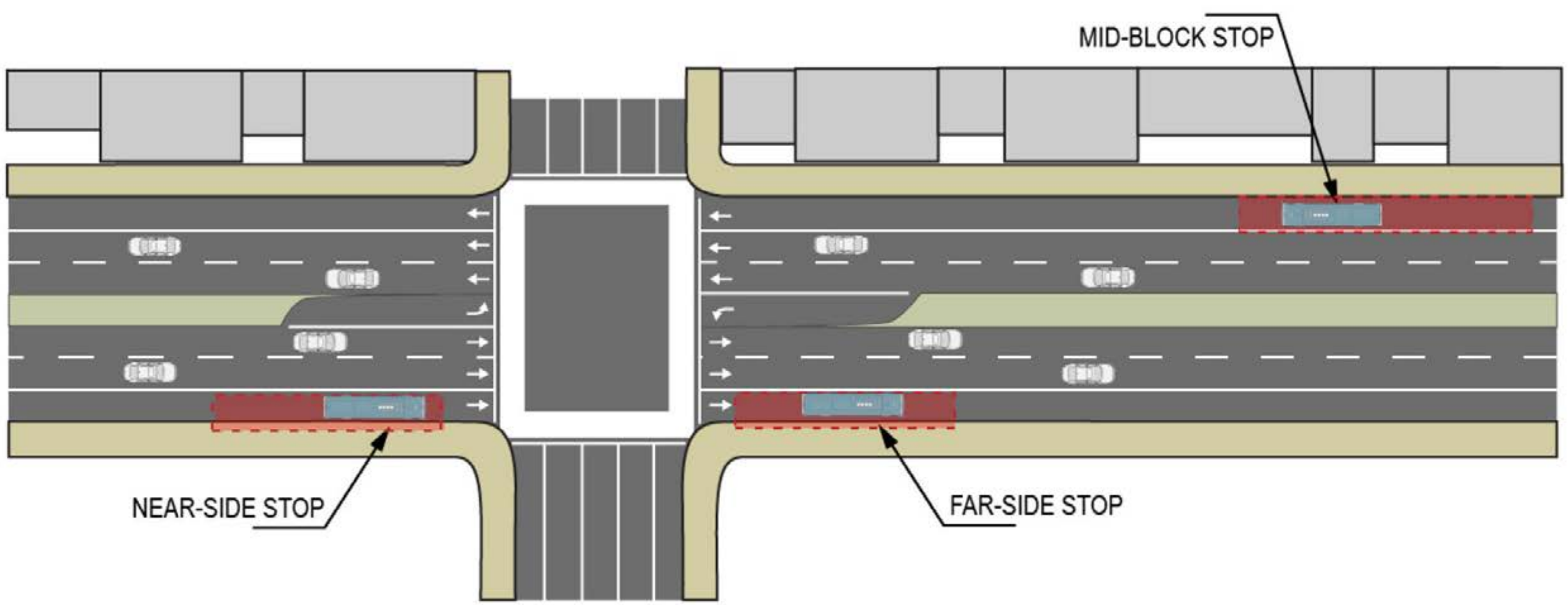
C. Spatial Location of Bus Stop

The specific location of a bus stop within the right-of-way is important for bus operations. A good bus stop location is one that is operationally safe and efficient for buses and is safe and convenient for passengers. The stop should be located where it causes minimal interference with pedestrian movements and other traffic, including bicycle traffic.

On-street bus stops are usually located along the street curb for direct safe passenger access to and from the sidewalk and waiting areas. Stops may be located on the far side of an intersection, the near side of the intersection, or at a point mid-block.

Far-side stops are stops located after an intersection in the direction of travel. They are generally preferred because they reduce conflicts between right-turning vehicles and stopped buses, eliminate sight-distance deficiencies on approaches to an intersection, and encourage pedestrian crossing at the rear of the bus. Additionally, since Rapid and BRT routes use transit signal priority to expedite travel across an intersection, far-side stops are integral to Rapid and BRT route implementation. Also, far-side stops allow passengers to cross the street from multiple directions to access the bus boarding area, due to its location on the corner of the intersection.

Near-side stops are stops located before an intersection in the direction of travel. They are acceptable when a far-side stop is deemed unsafe or impractical. They may also be used when a stop serves multiple routes that go in different directions after the downstream intersection. Like far-side stops, the stop's location allows passengers multiple crossing locations to access the bus boarding area, due to the location on the intersection corner.



Rhode Island bus Stop Design Guide. Providence: Rhode Island Public Transit Authority, 2017.[11]

Mid-block stops are stops that are not located in the general vicinity of an intersection. They are typically considered in special cases and are to be used only when no alternative is available. AC Transit and the jurisdiction where the bus stop will be located must approve any mid-block bus stops. This stop location generally has poor access due to the lack of formal street crossings near the stop, sometimes inducing passengers to reach the bus boarding area by crossing at undesignated locations.

In the typologies presented in Section 3, the diagrams feature far-side stops, as this is the stop location preferred by AC Transit. These typologies can be adapted to near-side or mid-block stops, if necessary.

D. Bus Stop Design

Floating bus stops are bus stops where the boarding platform is separated from the sidewalk by a bike lane. The bike lane is brought behind the bus stop to eliminate any potential conflict points between buses pulling into the stop and cyclists in the bike lane.

The appropriate width of a floating bus stop depends on many factors, including the width of travel lanes, width of bike lanes, and need for sidewalk space. A minimum width of eight feet is required for floating bus stops to ensure ADA-compliant access. However, where space permits, particularly for stops with large passenger volumes, a wider floating bus stop based on preferred dimensions may be designed.

The floating bus stop functions similarly to a bus bulb in that it allows the bus to stop in the travel lane. This design saves travel time for the bus by eliminating the need for the bus driver to merge in and out of traffic. The floating bus stop also provides a waiting area for passengers, and can relieve sidewalk congestion. This design may also save linear space compared to a traditional pull out bus stop, because when buses stop in the travel lane, pull-in or pull-out taper space is no longer required for buses to exit or enter the travel lane.

Vancouver, Canada

It is often a concern that buses stopping in traffic to serve a bus stop will slow traffic, but Federal Highway Administration studies show that stopping in the lane may actually increase traffic speeds on roadways with two travel lanes per direction (Kay Fitzpatrick, Kevin M. Hall, Stephen Farnsworth, and Melisa D. Finley: TCRP Report 65: Evaluation of Bus Bulbs (Washington, D.C.: Transportation Research Board, 2001), 2.).[12] Stopping in the travel lane reduces the phenomenon of bus drivers stopping with the bus protruding into traffic, thereby regularizing traffic flow. Typically, floating bus stops should not be installed on high-speed roads where the average travel speed is 35 miles per hour or greater, as stopping in the travel lane in such conditions may be unsafe.

On roadways with a single travel lane in one or both directions, local conditions, including vehicle volume and bus stop activity, should inform the use of floating bus stops. Floating bus stops may still cause the bus to partially block the travel lane when the bus boards and alights passengers. Therefore, motorists will need to wait for the bus to finish loading before they can progress. At a far-side stop, this wait time could cause cars to queue into the intersection and potentially block the intersection when the signal phase changes. Motorists may also try to divert around a stopped bus by entering the opposite-direction travel lane, which could be a safety concern.

AC Transit prefers that bus pullouts (turnouts) are avoided. Bus pullouts are generally detrimental to bus operations under most circumstances found in the AC Transit district and should be avoided. At a pullout, the roadway is widened just at the bus stop to channel the bus into a special curb lane. The bus then stops and serves the stop outside the travel lanes. Pullouts are generally not desirable for bus operations because they require the bus exit the traffic stream. Leaving the travel lanes can slow bus operations, particularly when the bus seeks to reenter traffic. Pullouts are generally designed for the convenience of other vehicles, not buses. Further, on Complete Street roadways with bicycle lanes, a bus pullout creates conflict with cyclists by requiring buses to fully cross the bike lane to pull in and out of the bus stop, as illustrated in the photo below.

Special cases where pullouts may be appropriate are unusually narrow roadways, such as those consisting of one very narrow travel lane (without a parking lane) in each direction. High-speed roadways without parking lanes may also be appropriate for pullouts. Further, there might be cases where bus pullouts could be useful for schedule adherence or layovers. However, these situations should be analyzed on a case by case basis. Finally, Transit Cooperative Research Program (TCRP) report 65 suggests pullouts for roads where traffic speeds are 40 mph and above.

Portland, OR

E. Bus Stop Dimensions

The required length of a bus stop is made up of the following components. Depending on the configuration of the bus stop (i.e. in lane vs. pull-out stop, near-side stop vs. far-side stop), not all elements will be present. Therefore, the total space required for a bus stop will be informed by the design and placement of the stop.

Bus Stop – total distance/area required for a bus to safely and efficiently pull into a stop, stop and load/unload passengers, and pull away from the stop and return to the travel lane. (Pull-in Taper + Platform + Pull-out Taper)

Platform – the area where the bus comes to a complete stop against the curb and from/to which passengers board and alight.

Pull-in Taper – the distance/area required for a bus to decelerate and exit the travel lane to reach the bus platform.

Pull-out Taper – the distance/area required for a bus to leave the bus platform, accelerate, and reenter the traffic stream.

Clearance from Crosswalk – the distance/area required from the front or rear of the bus and the adjacent crosswalk to ensure pedestrians and drivers have adequate sightlines.

Bus Stop Length

In addition to the selection of an appropriate location, there are other important requirements for bus stops. The required length of a bus stop is determined by the type of stop, stop location, stop amenities, roadway speed limit, and the number and type of buses expected to use the stop. There must be enough curbside space to enable bus operators to pull the bus parallel to the curb, open the doors onto the sidewalk, and pull away from the stop into the travel lane. Providing bus stops with sufficient length also prevents buses from straddling crosswalks, which can block access for pedestrians.

Required bus stop lengths vary depending on several factors:

- **Location of the stop relative to the intersection (far-side, near-side, or mid-block)**
- **Stop configuration**
- **Approach of bus turning movement**
- **Roadway speed, and thereby deceleration and acceleration space**
- **Presence of crosswalks, on-street parking, and driveways**
- **Location of landscaping and street furniture along the sidewalk edge**
- **Number of buses serving and/or laying over at the stop**

Because bus stop length will vary depending on the type and design of a specific bus stop, each typology presented in Chapter 4 includes a table detailing the dimensions required for that bus stop design. General design principles are described in the next subsections.

For buses that stop in the travel lane, the only consideration for the overall bus stop length is the platform itself, since no separate entering and exiting distance is required. The platform length is primarily determined by the size of the bus used on the route and the number of buses servicing the stop at peak hours.

At stops where the bus must pull out of the travel lane, the length required for a bus stop consists of three elements – the pull-in taper, platform/boarding length, and the pull-out taper. The stop must be long enough so that buses can not only stop there, but also get into and out of the stop easily. Adequate-length bus stops make it more likely that the bus driver will pull completely into the stop, rather than leave the back of the bus protruding into the travel lane. Because stopping flush with the curb is key for passengers with mobility impairments, providing a sufficiently long stop is an ADA issue.

Pull-In/Pull-Out Taper

Pull-in/pull-out taper applies only to curbside stops where the buses pull out of the travel lane. The length required for pull-in or pull-out taper is determined from the posted speed limit or prevailing speed, whichever is greater. If prevailing speed data cannot be collected, the posted speed limit should be used.

The stop location also affects the pull-in or pull-out taper distance required. Far-side stops do not require any additional pull-in taper because the bus can use the intersection to decelerate and pull into the stop. Conversely, for near-side stops, no pull-out taper is required because the intersection provides space to accelerate and merge back into the travel lane.

Platform Length

The length required for the platform is primarily a function of the type of bus the stop is designed to serve and the number of buses the stop must serve simultaneously. At a minimum, all AC Transit stops should be designed to serve a 40-ft bus. On routes where articulated buses are used, stops should be designed to serve 60-ft buses. The length of a platform should increase if it is determined that the stop must accommodate multiple buses simultaneously. The Transportation Research Board provides guidance for determining when stops should be designed to accommodate multiple buses, based on the number of buses per hour, average dwell time, and adjacent intersection signal cycle times.

Stop Amenities

Stop amenities include bus shelters, benches/seating, wayfinding, fare vending machines, bike parking, trees/landscaping, trash cans, lighting, and other amenities that are located within the bus platform area. Stop amenities can help attract customers and increase passenger comfort, improve operational efficiencies, and foster local civic pride and economic development.

The presence of stop amenities, particularly bus shelters or other large amenities, may impact the required platform length. Bus shelters and other large stop amenities restrict the space available for passenger circulation and movement and may require that the platform length be increased. The ADA requires bus stop boarding and alighting areas at the front door landing area, and an accessible route between the landing area, sidewalk, and bus shelters. A clear zone at the first rear door is also required by AC Transit.

Crosswalk Clearance

For all far-side and near-side stops, clearance from the crosswalk is required for pedestrian safety. NACTO's guidelines recommend a minimum of 10 feet of clearance between the rear of the bus and the crosswalk at a far-side stop. With a near-side stop, a minimum of 10 feet of clearance between the front of the bus and the crosswalk is recommended.

F. Door Locations and ADA Access

AC Transit utilizes a variety of fleet types, including 30-ft, 40-ft, and 60-ft buses, which have two, three, or four doors, depending on the vehicle model. Landing areas and clear zones should be laid out to accommodate the bus fleet in operation. Landing areas and clear zones should be free of driveways, curb ramps, and obstructions such as utility poles, hydrants, and other street furniture. AC Transit's design guidelines recommend designing all stops with two door landing areas to accommodate the first two doors of all vehicles, regardless of vehicle length or model.

For the first door landing area, ADA guidelines require that a minimum width of 5 feet along the curb, and a minimum depth of 8 feet perpendicular to the curb, be provided at the landing area, to the extent feasible and within the control of the transit agency. The location of the landing area is primarily dependent on the siting of the stop relative to the intersection, and secondarily, on the availability of sidewalk space to accommodate an ADA-compliant landing area. The first door landing area should begin one foot behind the bus stop pole.

To accommodate rear door passenger activity, bus stops should also have a second door landing area. On AC Transit vehicles manufactured by Van Hool, the second door serves as the ADA-accessible ramp entrance. Therefore, providing a second landing zone is important to ensure that the stop is ADA-compliant. The second door landing area should be 11.5 feet wide along the curb, with a minimum depth of 8 feet perpendicular to the curb. The second door landing area should begin 12.5 feet behind the bus stop pole.

The critical path of travel for passengers at a bus stop is the connection between the landing area and the sidewalk and bus shelters. The ADA requires that there be an accessible route between these points. Sidewalks and bus shelters shall be connected to the landing area by an accessible route. This requirement means that a clear, unobstructed, ADA-compliant path of travel must be provided. AC Transit prefers a 4-foot wide path, although the ADA requires a minimum 3-foot wide path, which can be used in extenuating circumstances.

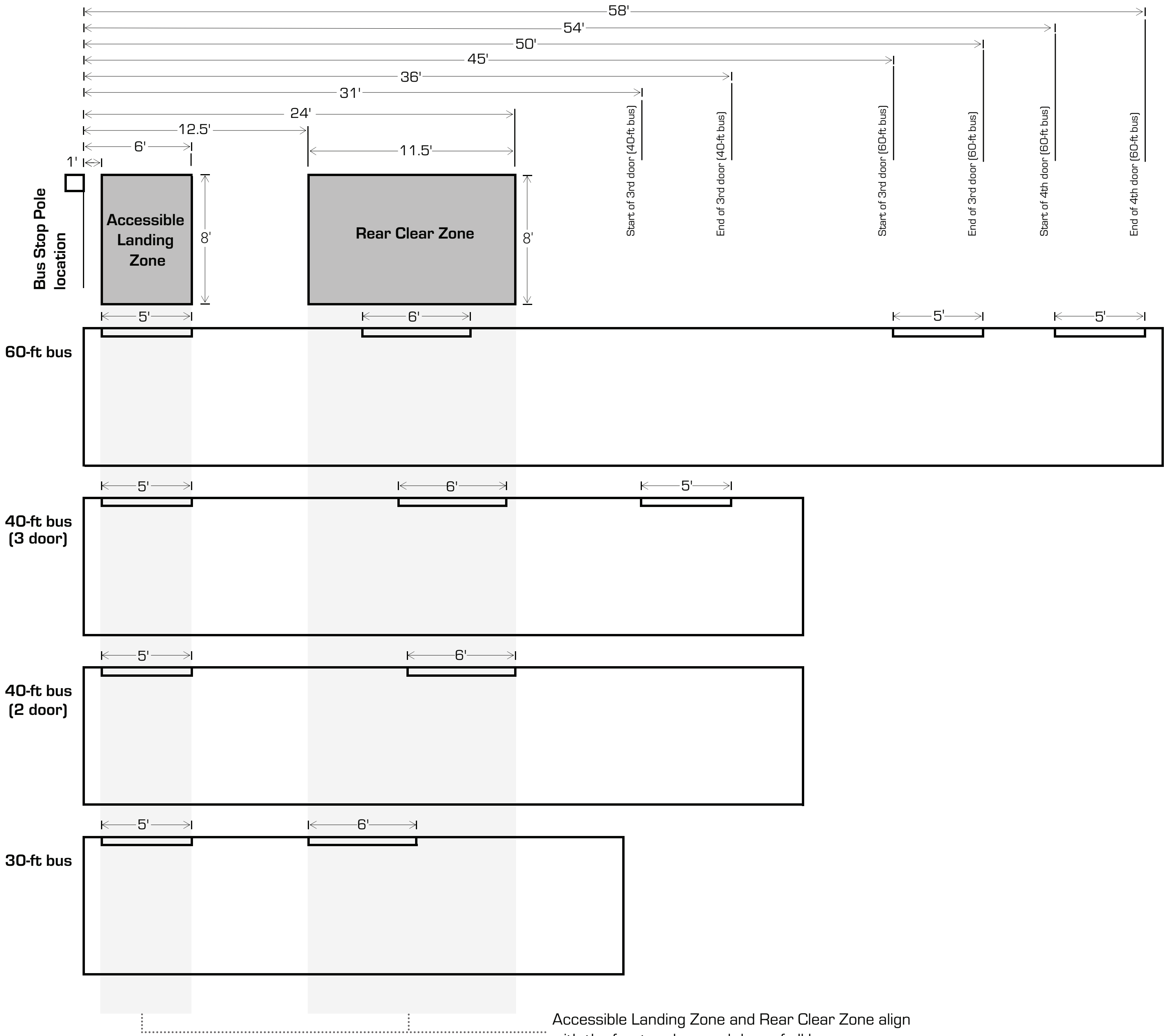


Exhibit 1: AC Transit Landing Area Dimensions of Common Bus Types

G. Bus Stop Pads

Bus pads are highly durable areas of the roadway surface at bus stops, usually constructed of concrete, that address the common issue of asphalt distortion at bus stops.

Conventional asphalt pavement is flexible, and can be moved by the force and heat generated by braking buses and trucks, leading to wave-shaped mounds along the length of a bus stop. This issue is pronounced at high-volume stops where dwelling buses further heat the roadway surface, as well as near-side stops in mixed-traffic lanes where trucks can add to wear.

Bus pads should be at least 8.5 feet wide to accommodate both wheels of a bus, but should be wider at locations without precision loading to provide consistent service when the bus does not pull fully to the curb. Bus pad length should be determined based on the length of the platform area.

At stops where the bus crosses a bike lane, the concrete bus pad should end at either the curbside edge of the bike lane or the outside edge of the bike lane (including its full width) to prevent the creation of a longitudinal joint within the bike lane. Bus pads should end before the crosswalk to prevent lateral or longitudinal pavement joints within the crosswalk. If a bus pad must be extended into the crosswalk, it should extend across the full width of the crosswalk to prevent joints between concrete and asphalt.

H. Curbs

The curb alongside the bus stop should be painted red to prevent cars from parking within the bus stop space or within the pull-in or pull-out zone that is required at traditional bus stops where buses must pull out of the travel lane. If cars are parked at a bus stop or within the pull-in or pull-out zone, then the bus will not be able to stop flush along the boarding platform which is inconvenient and dangerous for passengers, and can prevent bus ramps from being deployed, resulting in ADA accessibility issues. Curb height and design should be informed by local conditions or design standards.

I. Service Type and Level of Service

Finally, the service type and level of service provided on a route and/or corridor should be considered when determining the design of bus stops and prioritizing capital improvements. AC Transit has identified eight primary service types operated by the District. These are outlined in AC Transit Board Policy No. 550.[13]

Trunk Routes and Major Corridors – These are the services operating on corridors where residential densities are at least 20,000 residents per square mile (or comparable commercial densities). Routes in these corridors provide the backbone of the transit system; operate along the arterial streets and provide a high level of local and limited stop service. These routes have the highest priority for capital improvements.

Rapid - Provides limited stop service along a Trunk Route or Major Corridor featuring wide stop spacing, headway based schedules, transit signal priority and passenger amenities. Underlying local service contributes to aggregate service frequency.

Urban Secondary, Crosstowns and Feeder Routes – These are the routes operating in medium density corridors (10,000 – 20,000 residents per square mile or comparable commercial densities). These routes complement the trunk route network, providing a high level of local stop service. These corridors also are candidates for capital improvements to assist in bus operations.

Suburban Crosstowns and Feeder Routes – These are the routes operating in low density corridors (5,000 – 10,000 residents per square mile). These routes feed BART, park and ride lots, or other AC

Transit routes, or serve neighborhood circulation functions with a high level of service.

Low Density Routes – These are primarily routes operating in areas of very low density (fewer than 5,000 residents per square mile).

Community Flex Services – These are primarily routes operating in areas of very low density, again, fewer than 5,000 residents per square mile, that provide a more flexible operation than traditional fixed route service.

All-Nighter (Owl) Routes – These are the routes providing service between 12 midnight and 6 am. All-Nighter routes operate as a lifeline service during the "owl gap" period.

Transbay Routes – These are the routes providing service to downtown San Francisco via the Bay Bridge Corridor.

These service types form a hierarchy of service both in terms of service investment (annual service hours) and ridership. Therefore, AC Transit's policy directs staff to prioritize capital investments for service types with the highest levels of service and highest ridership. Additionally, because the service type classifications closely correspond with service frequency and ridership, they can be used to inform the bus stop design, dimensions, and amenities.

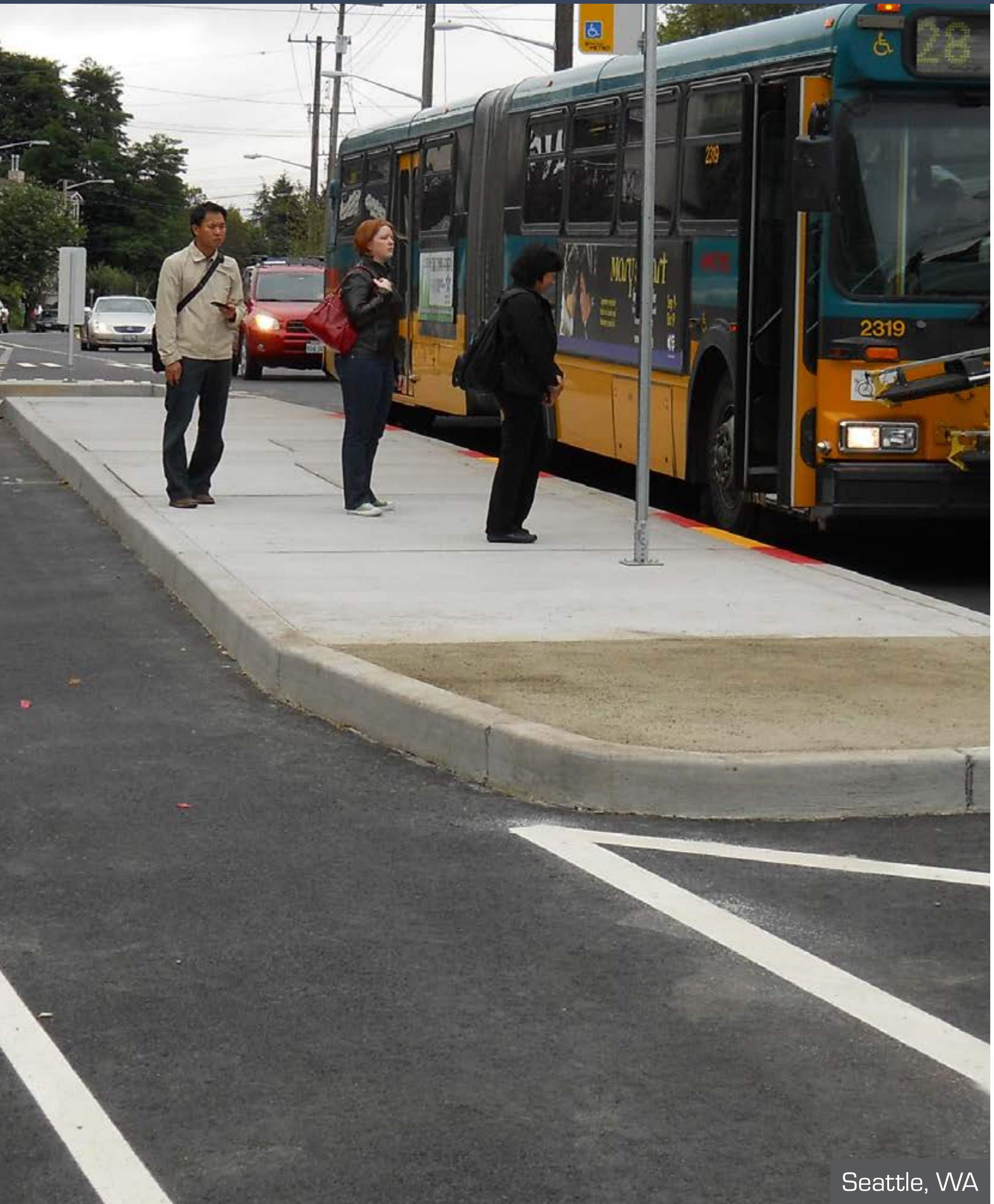
Table 3 outlines AC Transit's service types, span of service standards, and weekday peak frequency standards.

Service Type	Span of Service Standard	Weekday Peak Frequency Standard
Trunk and Major Corridors	19-24 hours daily	15-20 minutes
Rapid	14-16 hours daily	10-14 minutes
Urban Crosstown/ Feeder	14-16 hours daily	15-20 minutes
Suburban Crosstown / Feeder	14-16 hours daily	21-30 minutes
Very Low Density	14-16 hours daily	31-60 minutes
All-Nighter (Owl)	Owl gap period	31-60 minutes
Transbay	17-18 hours daily	21-30 minutes

Table 3: Span of Service and Weekday Peak Frequency Standards

Adapted from AC Transit Board Policy No. 550

3.0
Typology Design Considerations



Seattle, WA

Properly-placed design elements are critical to a positive overall experience for transit users. When reviewing individual bus stops and their context, designers must consider a wide range of issues that are unique to each location. In many transit corridors, the adjacent streetscape design elements may also contribute to the bus stop design. Due to constrained right-of-way, it is not feasible or practical to include all design elements at each bus stop location. The placement and use of design elements at bus stops should maximize safety, visibility, and comfort for all users. Designers are encouraged to consult with AC Transit or local guidance for additional design considerations.

3.1 General Guidance for Context Zones

For the purposes of this guide, establishing context zones simplifies the process of defining the roadway cross section along a corridor. Zones establish a foundation for designers to appropriately locate design elements tailored to the different uses expected of a roadway user. Exhibit 2 illustrates each zone with subsequent text describing the relationship between the zones and the design elements that commonly contribute to multimodal bus stop design.

Pedestrian Zone - This zone is generally reserved for pedestrian mobility for users of all ages and abilities to access pedestrian oriented destinations.

Furnishing Zone - This zone is generally reserved for seating, bicycle racks, street lights, parking pay stations, stormwater infrastructure, street trees, transit shelters, trash receptacles, in addition various utilities that support a multimodal environment. This zone can also be flexible and may vary between blocks and along a corridor.

Bus Stop Bypass Zone - This zone is generally reserved to route the bikeway around the rear of the bus stop between the furnishing zone and floating bus stop furnishing zone.

Bus Stop Furnishing Zone - This zone is generally reserved to function similar to the furnishing zone and may consist of seating, lean bar or railing, transit shelter, or vertical railings as space provides. The available width and length of the floating bus stop will determine the amount, type, and function of design elements placed in the floating bus stop furnishing zone.

Floating Bus Stop - This zone is generally reserved for users waiting in a dedicated space to access transit.

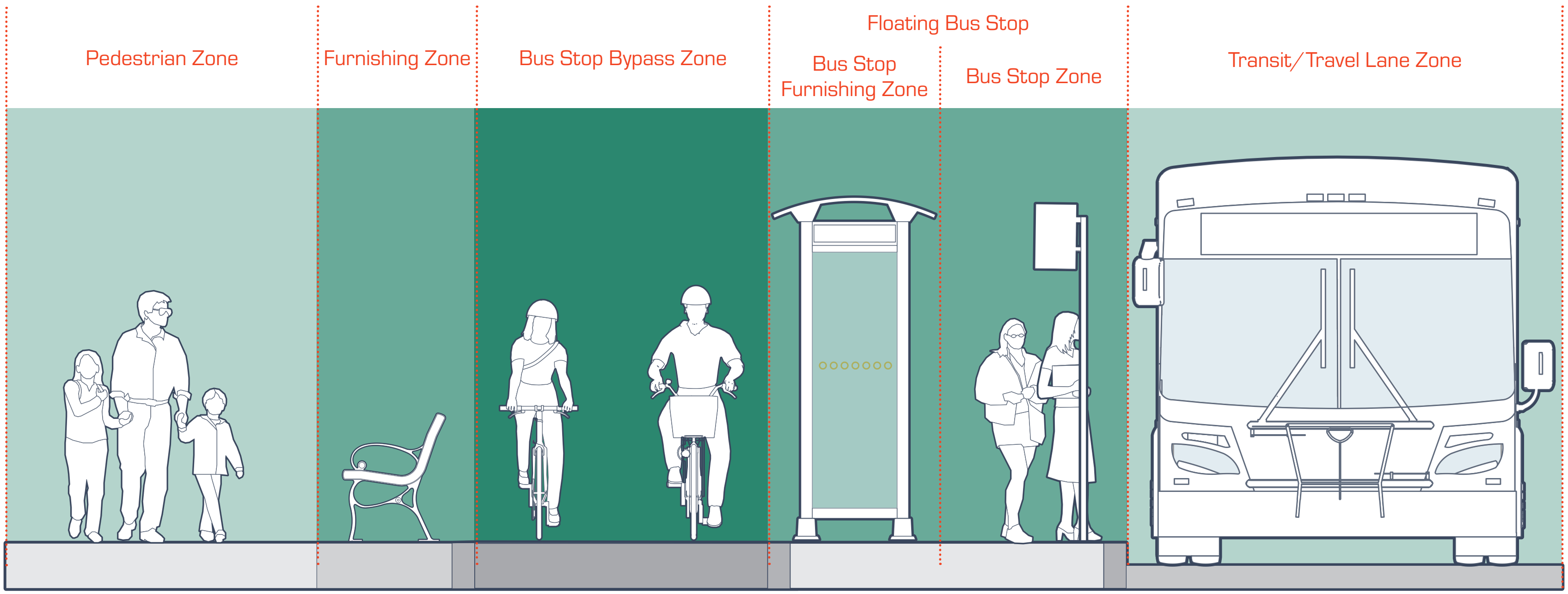


EXHIBIT 2: Context Zones

3.2 Design Elements

All bus stops should consider utilizing appropriate design elements to provide a safe, accessible, and high-quality transit experience. This section defines typical bus stop design elements either as standard, recommended, or optional. Standard design elements are typical of bus stops, bicycle facilities, pedestrian facilities, etc. Including recommended design elements should result in a high quality bus stop for all users. Design elements have been noted as optional to be sensitive to design preferences of jurisdictions.

Accessible Landing Pad (Furnishing/pedestrian zone or bus stop furnishing zone) – Standard

ADA guidelines require a minimum of 5 feet along the curb and a minimum depth of 8 feet perpendicular to the curb to be provided at the landing area. It should be a firm, stable surface, with a maximum 2% cross slope. The landing area should match the roadway running slope to the extent practicable and be parallel to the roadway.

Benches (Furnishing/pedestrian zone or bus stop furnishing zone) – Optional

Providing seating at bus stops is a pleasant amenity for transit users waiting for the bus. Benches may be stand-alone or integrated into a shelter. ADA does not provide guidance for outdoor benches, however the Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG) suggests that benches providing full back support and armrests better assist pedestrians with mobility impairments to sit and stand.

Vancouver, Canada

Bicycle Facility Elevation (Bus stop bypass zone) – Standard

Bicycle facilities may be provided at the same elevation with the sidewalk, at street level, or at an intermediate height with a 2- to 3-inch curb reveal between the sidewalk and street level. The appropriate elevation of the bicycle facility will often be based on known physical constraints or design feasibility. The advantages or disadvantages of these designs are discussed thoroughly in separated bike lane guidance. A designer should consult these references prior to choosing the appropriate bikeway elevation treatment.

Bicycle Racks (Furnishing zone or bus stop furnishing zone) – Recommended

Installing bicycle parking at bus stops increases a transit passenger's flexibility to park their bicycle and take transit. These decisions may be based on many external factors including distance, weather, convenience, and effort. This amenity improves first- and last-mile connections and can increase the desirability of combined bicycle and transit trips.

Furthermore, if the bus bicycle rack is at capacity, bicycle parking allows bicyclists to lock their bike if they choose. Bicycle racks should be placed outside of the path of travel at the bus stop and positioned so that no matter how a bicycle is locked, a one foot buffer from the bikeway and the edge of the locked bike will be maintained. Refer to the Association of Pedestrian and Bicycle Professionals (APBP) Bicycle Parking Guidelines for the appropriate type and placement of bike racks.

Essentials of Bike Parking: Selecting and Installing Bike Parking that Works. Association of Pedestrian & Bicycle Professionals. 2015.[14]

Bike Ramp (Bus stop bypass zone) – Standard

When the elevation of the bicycle facility changes at a floating bus stop, a smooth ramp transition should be provided to allow comfortable passage for bicyclists through the bus stop influence area.


Cambridge, MA

Bus Shelters (Furnishing zone or bus stop furnishing zone) – Optional

Shelters provide a safe, secure, and comfortable space for users waiting for their bus. Shelters offer protection from inclement weather, and, in some cases, include lighting, heating, and opportunities for additional seating. Transit information, including route numbers, timetables, and, in some cases, maps, may also be provided at shelters.

The design of shelters should be simple, functional, and easy to maintain. The size of shelters will largely depend upon the amount of available space at a bus stop location.

Bus Stop Pole (Furnishing zone or bus stop furnishing zone) – Standard

Bus passengers need information to understand which bus routes will stop at their location. This pole and sign can also include information such as the route direction, schedule, etc.

Channelization (Bus stop bypass zone) – Recommended

Channelizing infrastructure can be designed to manage pedestrian and bicyclist movements between the travel lane, bikeway, and pedestrian facility. Pedestrians and bicyclists can be separately and effectively channelized by locating a vertical object (e.g., planter) to physically deflect and direct users to desired areas. For example, pedestrians could be channelized to designated crossings of the bikeway between sidewalk and floating bus stop. Effectively channelizing bicyclists and pedestrians through a bus stop can improve safety, provide maximum convenience, and enhance functionality.

Portland, OR

Crosswalks (Pedestrian zone) – Standard

Crosswalks provide designated routes for pedestrians to cross another facility. Maintaining a pedestrian access route between the sidewalk, floating bus stop, and additional bus stop design elements is required. All crosswalks should be located to maximize visibility for pedestrians and of pedestrians by drivers and bicyclists. Bus stops should connect to a marked pedestrian crossing, preferably a crosswalk behind the stop, so that passengers are encouraged to cross behind the bus. Intersections and at-grade driveway crossings should have ADA-compliant curb ramps.

Detectable Warning Surface (Pedestrian zone) – Standard

The ADA requires that bus stop boarding and alighting areas shall be connected to streets, sidewalks, or pedestrian paths by an accessible route. Detectable warning surfaces provide a tactile and noticeable message that a change of environment will occur between these areas.

Green Colored Pavement (Bus stop bypass zone) – Optional

The consistent use of green colored pavement may be used to delineate the bicycle zone or to emphasize areas of potential conflict. An alternative option is to use contrast to mark the separate zones, such as different colored concrete, or using asphalt for the bikeway and concrete for the floating bus stop and sidewalk.

Green colored pavement may be considered for optional use in marked bicycle facilities and in extensions of bicycle facilities through intersections and other traffic conflict areas. The use of dashed green colored pavement indicates merging areas for the bicycle facility and vehicular traffic. Solid green colored pavement may be used to designate the bike lane zone

Lean Bar or Lean Rails (Pedestrian/Furnishing Zone or bus stop furnishing zone) – Optional

Lean rails may be used in place of traditional benches. These amenities establish a narrow barrier between the bus island and the bus stop bypass to deter transit passengers from crossing the bicycle facility in non-designated spots. They also invite passengers to use these amenities casually as they wait for their bus.

Lighting (Furnishing Zone or bus stop furnishing zone) – Recommended

Bus stop lighting provides safety and security for all users while also increasing visibility of waiting passengers for bus operators. Sufficient illumination can be achieved with pedestrian-scale fixtures, lighted shelters, and street lights. The Illuminating Engineering Society provides guidance on how much illuminance to provide. Refer to Illuminating Engineering Society (IES), Roadway Lighting RP-8-14. 2014.[15]

Railings (Bus stop furnishing zone) – Optional

Vertical railings may be useful at channelizations (bus stop bypasses), as they establish a barrier between the bus island and the bicycle facility routing behind it, deterring transit users from crossing the bicycle facility in non-designated locations.

Rear Landing Area (pedestrian/furnishing zone, bus stop furnishing zone) – Standard

The clear zone is the area where the back doors of the bus open onto the sidewalk or floating island. AC Transit requires bus stops to have a clear zone for the first rear door. The clear zone should be free of driveways, curb ramps, and obstructions such as utility poles, hydrants, and other street furniture. Although there is no requirement for the clear zone to be ADA-compliant, it is desirable, and at a minimum should be a level surface area. The clear zone should be 11.5 feet wide by 8 feet deep.

Street Trees and Stormwater Infrastructure (furnishing zone or bus stop zone) – Optional

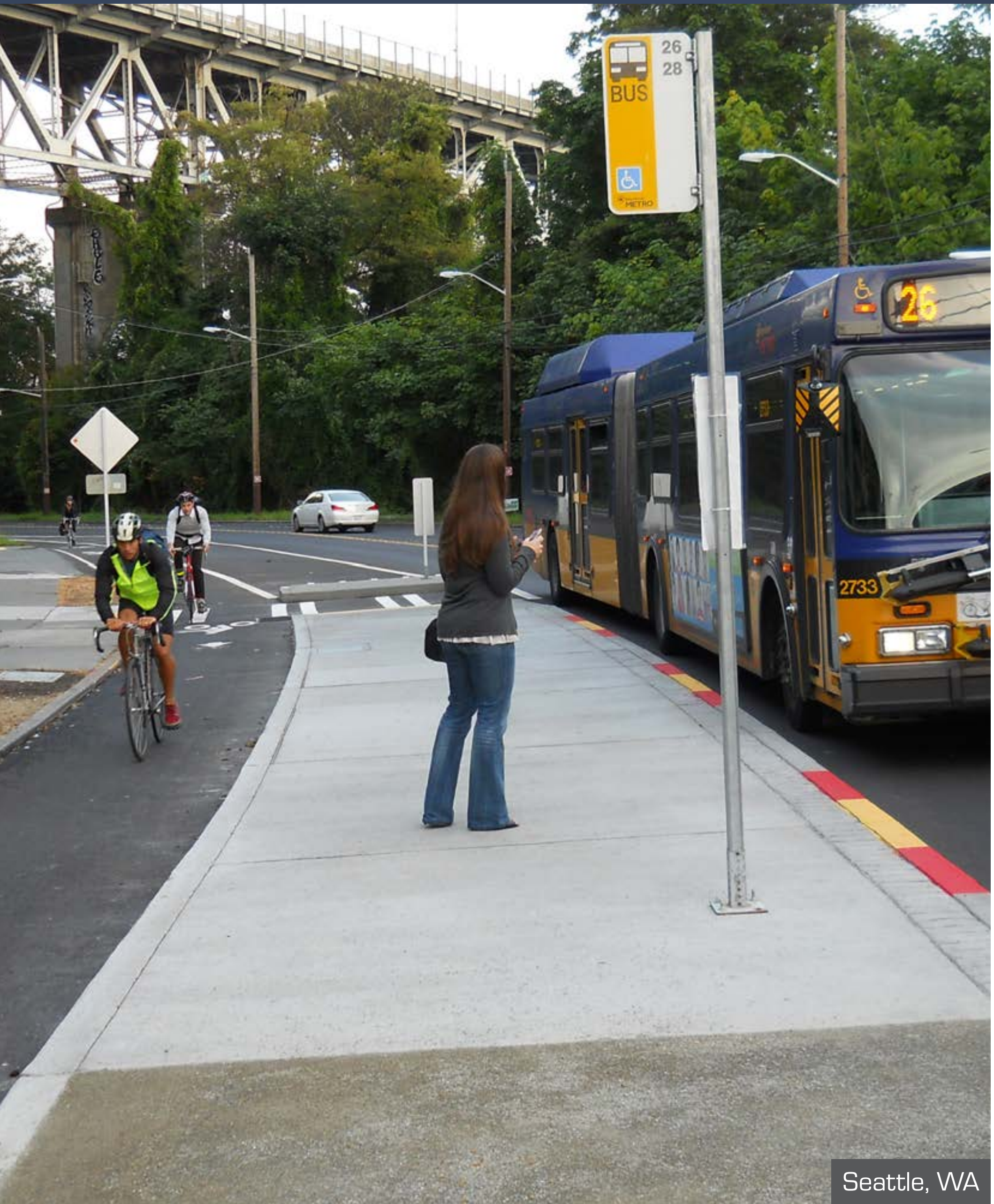
Properly selected and maintained landscaping helps enhance passenger comfort at a bus stop and may improve the overall aesthetic of transit service. Street trees at bus stops can help provide shade and protection from adverse weather. Placement of street trees or stormwater infrastructure should not disrupt safety, visibility, or service at the bus stop location. Street trees, landscaping, and stormwater infrastructure should be selected based on environmental performance, maintenance, and aesthetic goals of the jurisdiction.

Trash receptacles (furnishing zone) – Optional

Trash and recycling receptacles or solar compactors are desirable at higher-ridership stops, stops in commercial areas and retail centers, and stops with shelters. AC transit recommends locating trash and recycling receptacles on the sidewalk to clarify that maintenance is a City responsibility, which may assist with keeping the overall buildup of debris to a minimum.

Sydney, Australia

4.0 Bus Stop Design Typologies



Seattle, WA

Designing a safe, comfortable, and functional bus stop for all users with special consideration to bicycle users is a primary purpose of this guide. Local jurisdictions are implementing more separated bike lanes on transit corridors and need design guidance to safely and seamlessly maintain bikeways through the bus stop. Based on common roadway and bikeway configurations, transit operations, and other considerations, five bus stop design typologies have been identified:

- **Typology 1: Class II Bicycle Facility between the Curb and a General Traffic Lane**
- **Typology 2: Class II Bicycle Facility between Curbside Parking Lane and a General Traffic Lane**
- **Typology 3: Class IV Bicycle Facility (Separated Bikeway) between the Curb and a General Traffic Lane**
- **Typology 4: Class IV Bicycle Facility (Separated Bikeway) between the Curb and a Parking Lane**
- **Typology 5: Class IV Bicycle Facility (Two-way Separated Bikeway) between the Curb and a Parking Lane**

Each design typology contains design elements reflecting the context of the roadway environment. Required and optional design elements are specified within the typologies, but the designer should use engineering judgment when selecting and locating design elements for a bus stop design. These bus stop typologies are intended to illustrate how and why design elements are included to provide a safe, comfortable, and functional bus stop.

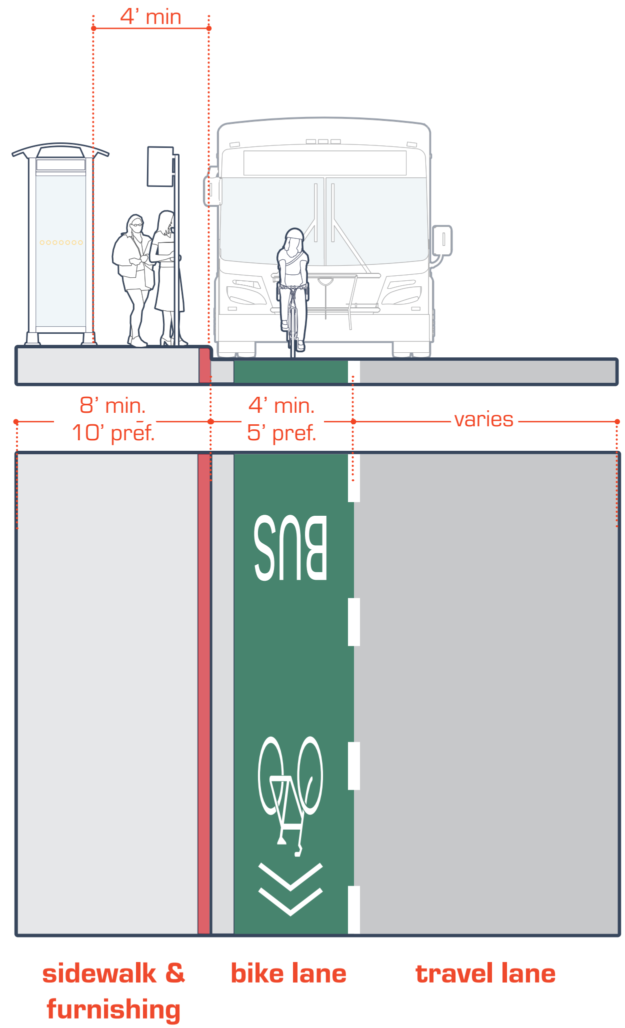
Bus stops should be provided curbside (against a curb) in most instances, as this is the most functional location for a bus stop. In the typologies, the bus stop curb is located either along the sidewalk (Typology 1) or along a floating bus stop (Typologies 2-5).

Four of the five typologies utilize floating bus stops, which are sidewalk-level platforms built between the bicycle lane and the roadway travel lane. When using floating bus stops, bicyclists are directed behind the bus stop, reducing or eliminating most conflicts between buses and bicyclists. By eliminating the need for buses and bicycles to interact, floating bus stops have large safety benefits for bicyclists. They can also benefit pedestrians, as the floating bus stop doubles as a pedestrian refuge, which if designed efficiently, can shorten crossing distances and enable shorter signal cycles.

4.1 Typology 1
Class II Bicycle Facility between Curb and a General Traffic Lane

The first Typology illustrates locations where the bike lane is located adjacent to the curb on a roadway. This typology more likely pertains to transit routes outside of a priority bicycle network. The section view illustrates that the bus will position itself on top of the bike lane to board and alight passengers. This means the bus may block motorists and bicyclists. These roadway users may have to wait or move around a bus during boarding/alighting operations.

A. Typology 1: Section View



If a transit corridor consistently implements Typology 1, normal bus operations may cause a "leap-frogging" effect for bicyclists. Leap-frogging is described as: A) a bus will pass a bicyclist between bus stops, B) the bus boards/alights passengers, C) the bicyclist passes the dwelling bus, and D) then the bus passes the bicyclist between the bus stops again. The leap-frogging process could repeat several times, especially if the average bus speed is similar to a bicyclist's riding speed. This effect is uncomfortable for bicyclists and increases the likelihood they will exit the bike lane into mixed traffic to pass a dwelling bus, which increases their crash risk with automobiles.[16] Leap-frogging is a known operational issue and is usually mitigated by implementing more separation between the vehicle lane and the bike lane, which may then necessitate the use of the subsequent design typologies described in this document.

Several design elements have been explicitly called out for Typology 1. A bus stop has minimum design constraints so that an accessible landing zone and a rear clear zone are provided. The location of these zones at the bus platform varies depending on the prevailing bus size. Also, this typology includes design elements typically employed at roadways and bus stops such as a furnishing zone, bus stop pole, and detectable warning surfaces on the sidewalk ramps. Lastly, note the optional design elements such as the bus shelter, green pavement markings, and red curb zone. The exact location and scale of these design elements may vary based on the constraints and context of the bus stop.

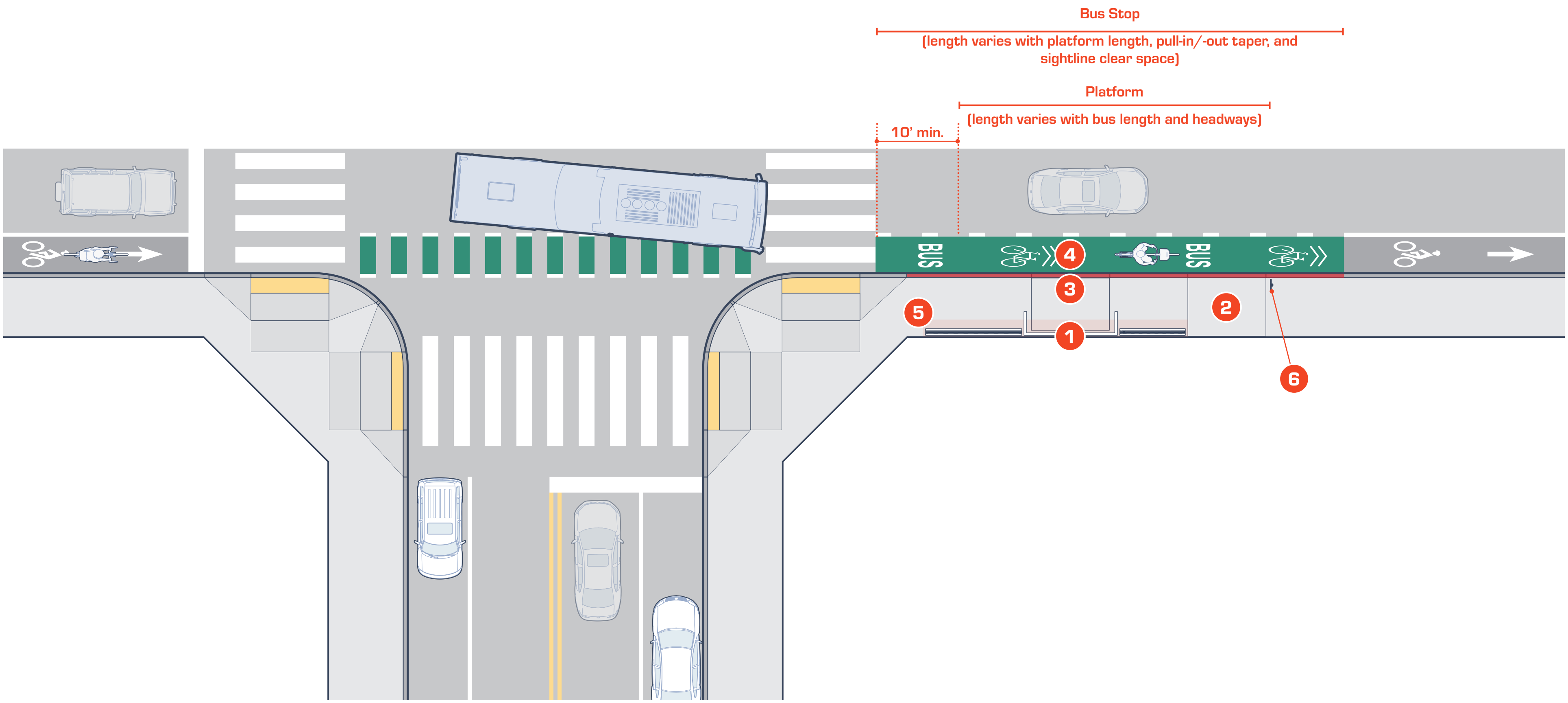
The bus stop and platform length will vary based on many factors including the pull-in/-out taper, sight distance, physical bus dimensions, and headways. Table 4 provides guidance for these dimensions on Typology 1, but the designer should use engineering judgment based on the roadway context and design constraints.

	Arterial Speed Limit		
	< 20 MPH	20-35 MPH	>35 MPH
Platform			
40' Bus	40'	40'	40'
60' Bus	60'	60'	60'
Two 40' Buses	120'	120'	120'
One 40' Bus and One 60' Bus	140'	140'	140'
Two 60' Buses	180'	180'	180'
Pull-in Taper			
Far-side Bus Stop	N/A	N/A	N/A
Near-side Bus Stop	10'	15'	20'
Mid-block Bus Stop	10'	15'	20'
Pull-out Taper			
Far-side Bus Stop	10'	15'	20'
Near-side Bus Stop	N/A	N/A	N/A
Mid-block Bus Stop	10'	15'	20'
Clearance from Crosswalk			
Far-side Bus Stop	10'	10'	10'
Near-side Bus Stop	10'	10'	10'
Mid-block Bus Stop	N/A	N/A	N/A

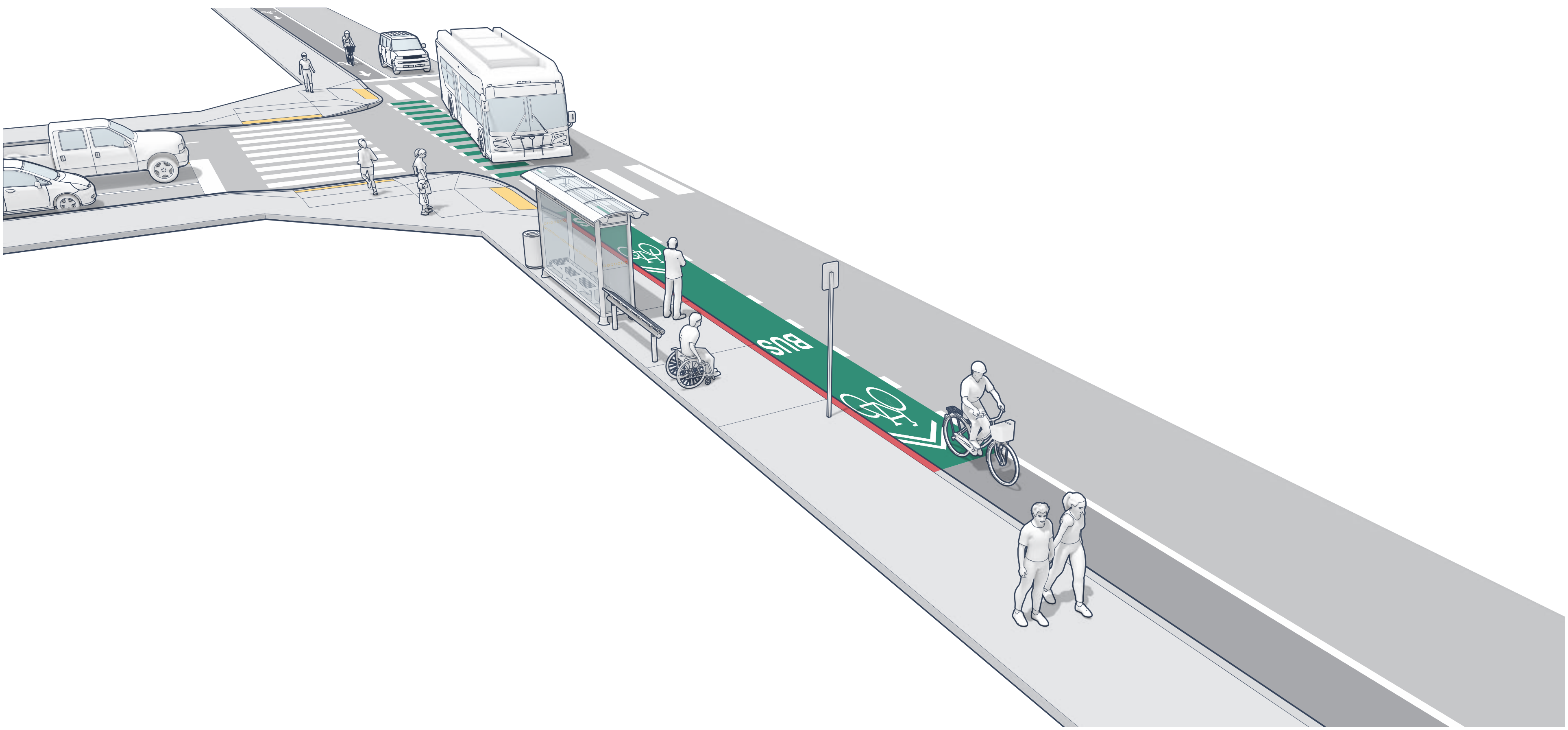
Table 4: Typology 1 Influence Area Minimum Dimensions

B. Typology 1: Plan View

1. Bus shelter (optional)
2. Accessible landing zone (min. 5' x 8')
3. Rear clear zone (11.5' x 8')
4. Green pavement (optional)
5. Furnishing zone
6. Bus stop pole



C. Typology 1: Perspective View



4.2 Typology 2
Class II Bicycle Facility between Curbside Parking Lane and a General Traffic Lane

A. Stop Placement and Bike Facility Alignment

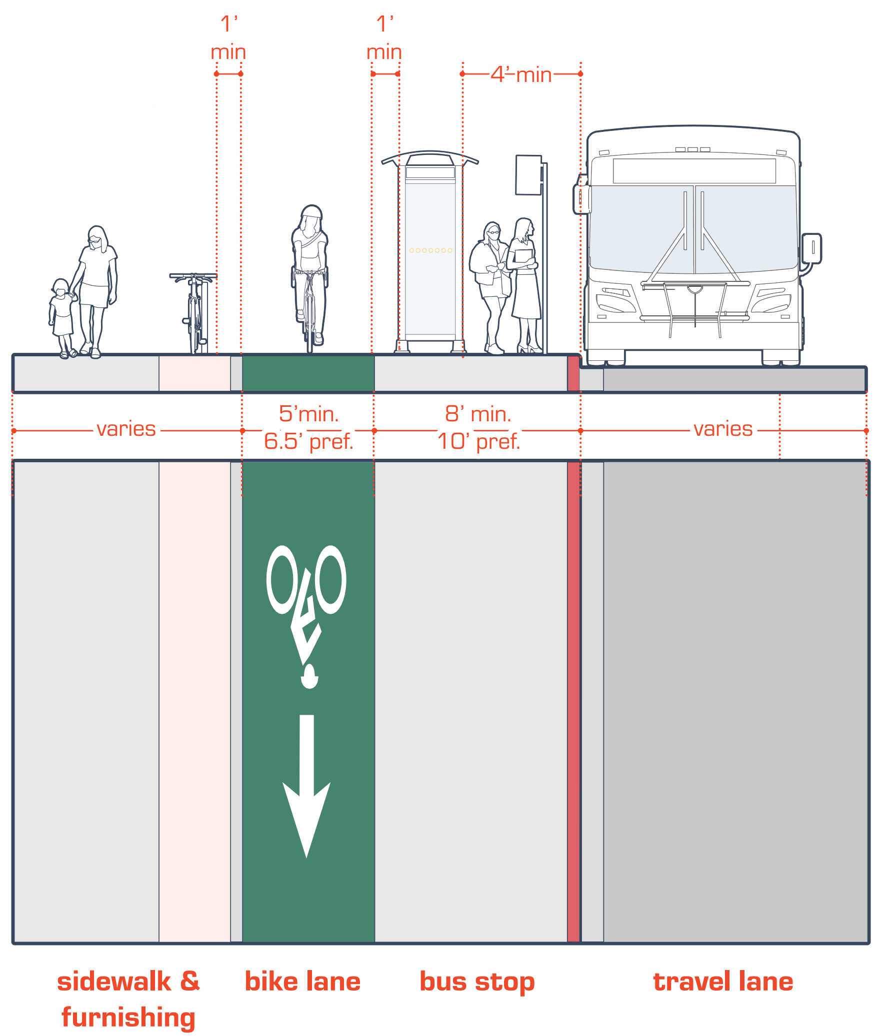
Adding parking to the roadway influences the spatial relationship between the bus boarding/alighting operation and the bike lane. Parking operations may cause conflicts with bus operations, and the door zone of parked vehicles can be a hazard for bicyclists. However, implementing a floating bus stop is an improvement for bicycle and transit operations, because the bus boarding/alighting operations can be performed independently of through bicycle movements.

AC Transit prefers far-side bus stops for a variety of bus-related operational reasons (AC Transit Policy No. 508); however, the designer can consider using near-side or mid-block bus stops. Note that conventional mid-block bus islands are illustrated but are not a preferred design because they create a potential conflict with bicyclists by requiring buses to fully cross the bike lane to pull in and out of the bus stop.

The key design characteristic of Typology 2 is the routing of the bike lane behind the bus stop, which minimizes conflicts between the bicycle movement and the bus boarding/alighting operation. The design elements at the floating bus stop and the furnishing zone should be located at least one foot from the edge of the bike facility. If a bicycle rack is located in the furnishing zone, the edge of a parked bicycle should be at least one foot from the edge of the bike facility, which may necessitate moving the bike rack further toward the building frontage. This shy distance improves bike operations and minimizes safety hazards from handlebar or pedal strikes.

Bus passengers have two designated bike lane crossings from the sidewalk to the floating bus stop, which helps manage pedestrian/bicycle interactions. Importantly, bicyclists are required to yield to pedestrians

B. Typology 2: Section View



at these designated crossings with the use of yield markings and an optional “Bike Yield to Pedestrians” MUTCD R9-6 sign. The furnishing zone and/or detectable edge assists with managing bus passenger crossings at those two locations.

Furnishing elements could include bicycle racks, trash receptacles, etc. Alternatively, detectable longitudinal panels can be embedded along the bike lane to guide visually impaired pedestrians to the designated bike lane crossing, as shown in exhibit 3 and in the photo to the right. These directional indicators are in accordance with International Standard 23599 and their color should contrast with adjoining concrete or asphalt pavement.

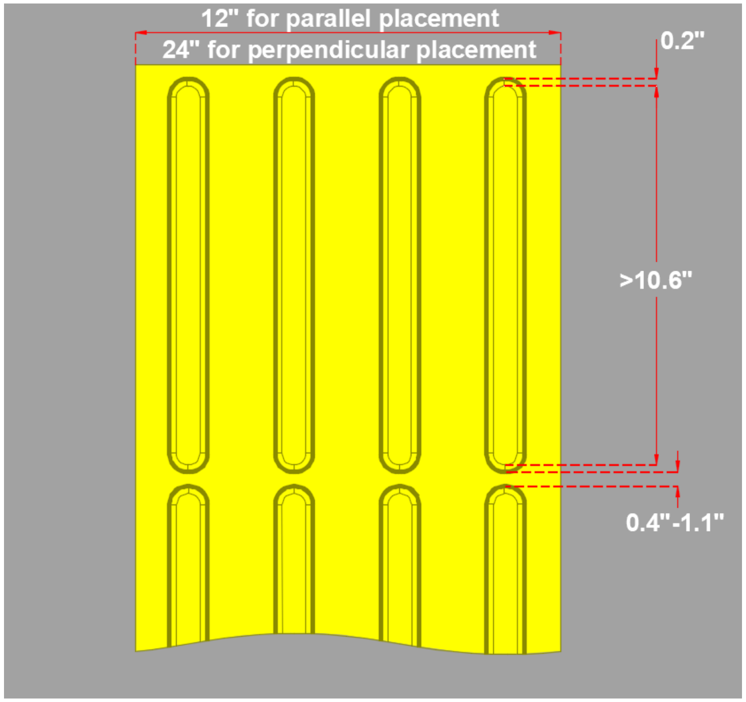


Exhibit 3: Longitudinal detectable edge

There are several bike lane-specific design elements which should be included when designing a bus stop based on Typology 2.

6 The bicyclist yield area provides space for bicyclists to stop for crossing pedestrians while also being protected from traffic.

7 The maximum bicycle ramp slope should be 1:12 from street to sidewalk level.

9 The bike lane transition taper of 1:10 is preferred, with a maximum of 1:5.[17]

Providing more space for bicyclists to yield for pedestrians and/or constructing a gentler slope or taper for the bike lane will improve comfort for bicyclists.

Lastly, vertical railings or lean rails may be optionally employed in Typology 2.

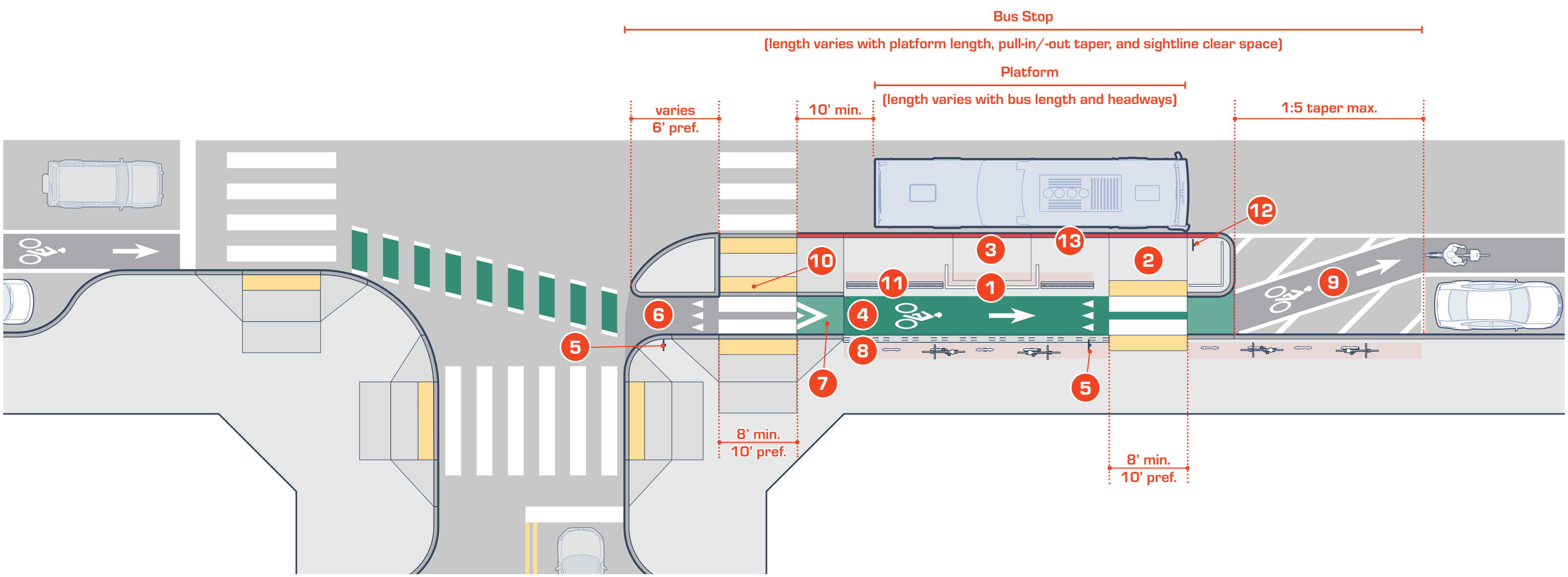
Table 5 provides guidance for these dimensions on Typology 2.

	Arterial Speed Limit
	All Speeds
Bus Stop Island	
40' Bus	40'
60' Bus	60'
Two 40' Buses	120'
One 40' Bus and One 60' Bus	140'
Two 60' Buses	180'
Entering Bike Lane Taper Distance	
Far-side Bus Stop	N/A
Near-side Bus Stop	24'
Mid-block Bus Stop	24'
Exiting Bike Lane Taper Distance	
Far-side Bus Stop	24'
Near-side Bus Stop	N/A
Mid-block Bus Stop	24'
Clearance from Crosswalk	
Far-side Bus Stop	10'
Near-side Bus Stop	10'
Mid-block Bus Stop	N/A

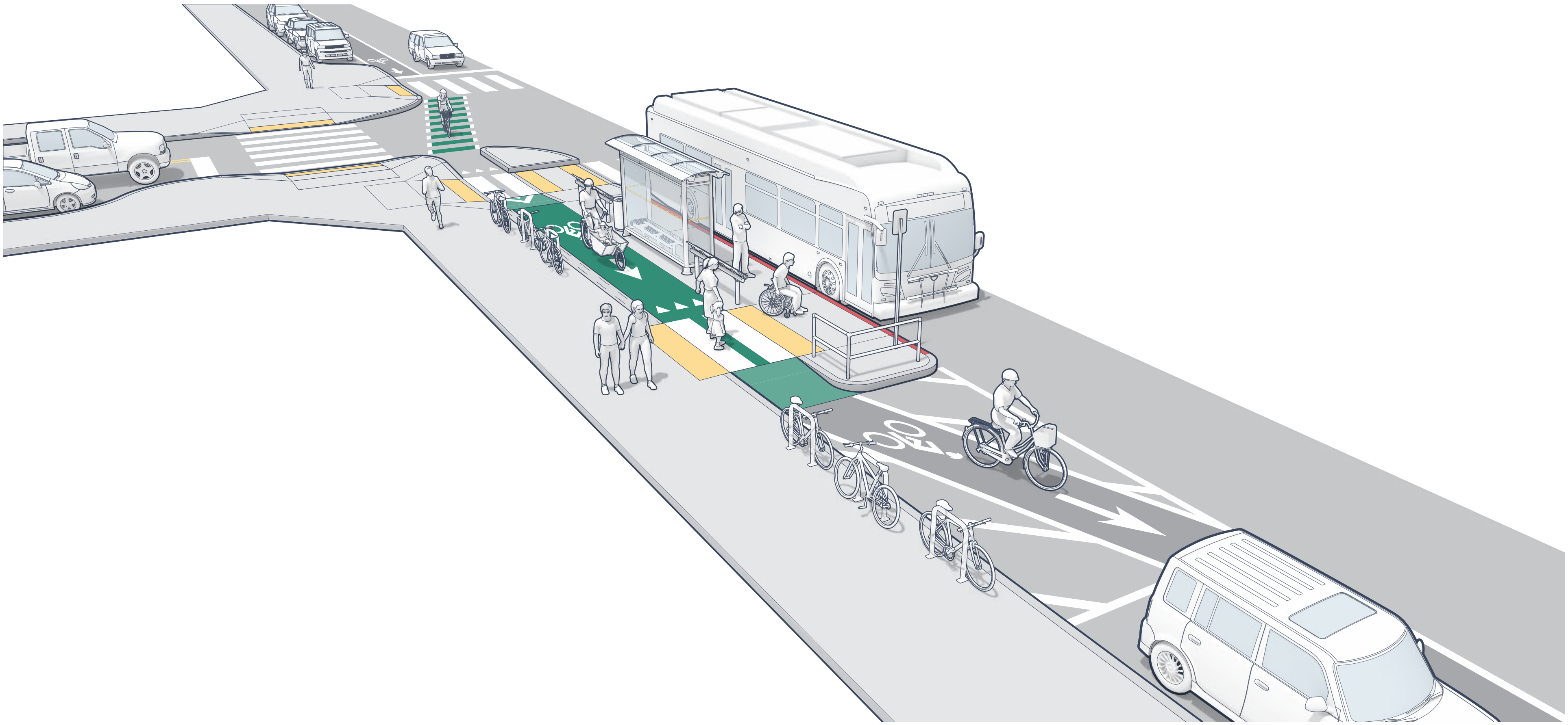
Table 5: Typology 2 Influence Area Minimum Dimensions

C. Typology 2: Plan View

1. Bus shelter (optional)
2. Accessible landing zone (min. 5' x 8')
3. Rear clear zone (11.5' x 8')
4. Green pavement (optional)
5. Bikes yield to peds sign (optional)
6. Bicyclist yield area
7. Bicycle ramp (max 1:12 slope)
8. Furnishing zone/Detectable edge
9. Bike lane taper (preferred 1:10 / max. 1:5)
10. Detectable warning surface
11. Vertical railing (optional)
12. Bus stop pole
13. Red curb zone (optional)



D. Typology 2: Perspective View



4.3 Typology 3
Class IV Bicycle Facility (Separated Bikeway) between the Curb and a General Traffic Lane

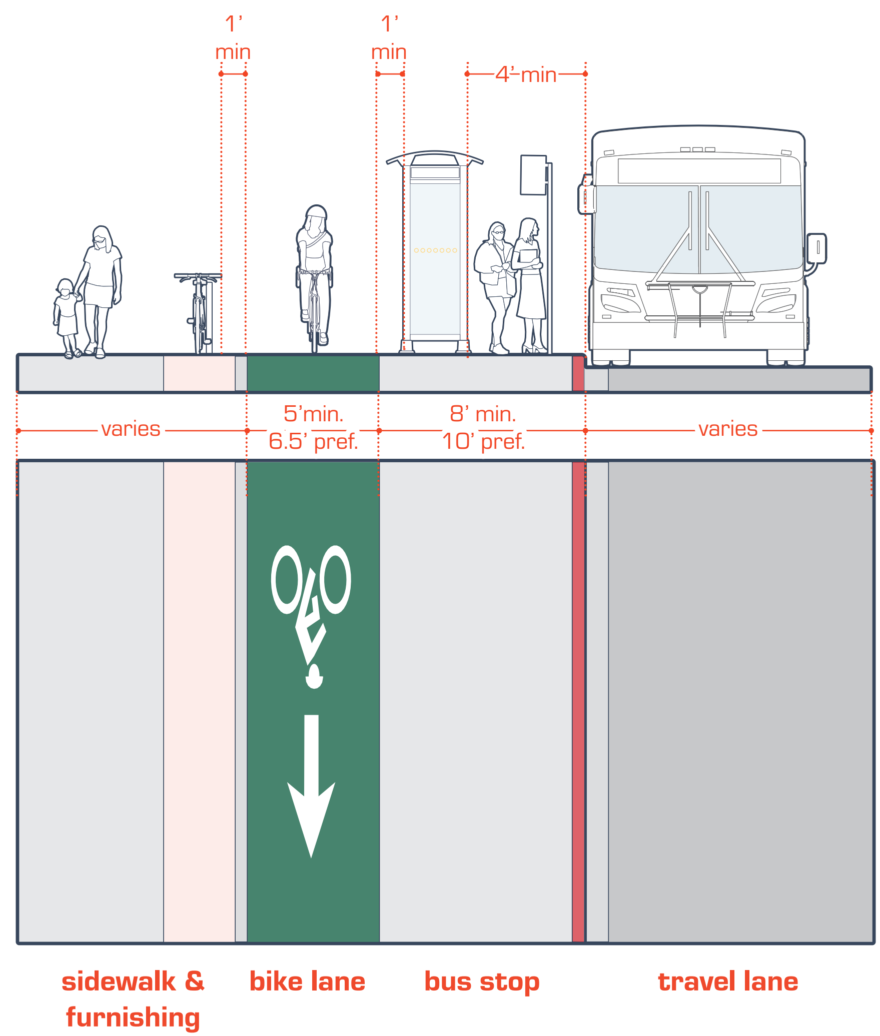
Typology 3 contains the same elements and dimensions in the cross-sectional view as Typology 2. Both designs route the bike lane behind the floating bus stop platform with a 1-foot shy distance between the bike lane and any furnishing or bus stop elements.

The difference between Typologies 2 and 3 is the presence of parking. In Typology 2, a parking lane is located to the inside of the bicycle lane; in Typology 3, there is no parking lane. Parked vehicles influence the bike lane taper lengths through intersections and exiting the bus platform area.

Typology 3 illustrates vertical separation with white plastic flexposts between the travel lane and the bikeway. There are many different forms of vertical separation that can be employed and there are several guidebooks discussing their benefits and drawbacks. In general, choosing any form of approved vertical separation will be appropriate in conjunction with a floating bus stop design.

Table 6 provides guidance for these dimensions on Typology 3.

A. Typology 3: Section View

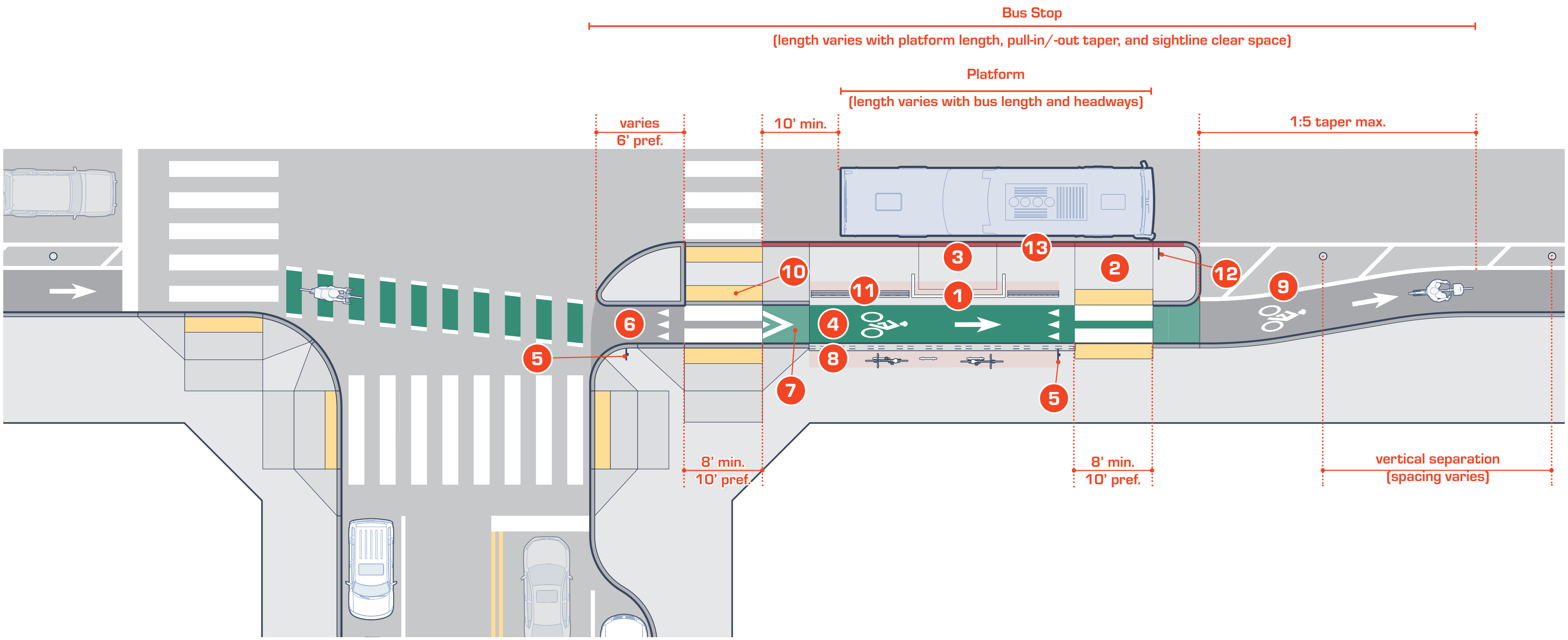


	Arterial Speed Limit
	All Speeds
Bus Stop Island	
40’ Bus	40’
60’ Bus	60’
Two 40’ Buses	120’
One 40’ Bus and One 60’ Bus	140’
Two 60’ Buses	180’
Entering Bike Lane Taper Distance	
Far-side Bus Stop	N/A
Near-side Bus Stop	18’
Mid-block Bus Stop	18’
Exiting Bike Lane Taper Distance	
Far-side Bus Stop	18’
Near-side Bus Stop	N/A
Mid-block Bus Stop	18’
Clearance from Crosswalk	
Far-side Bus Stop	10’
Near-side Bus Stop	10’
Mid-block Bus Stop	N/A

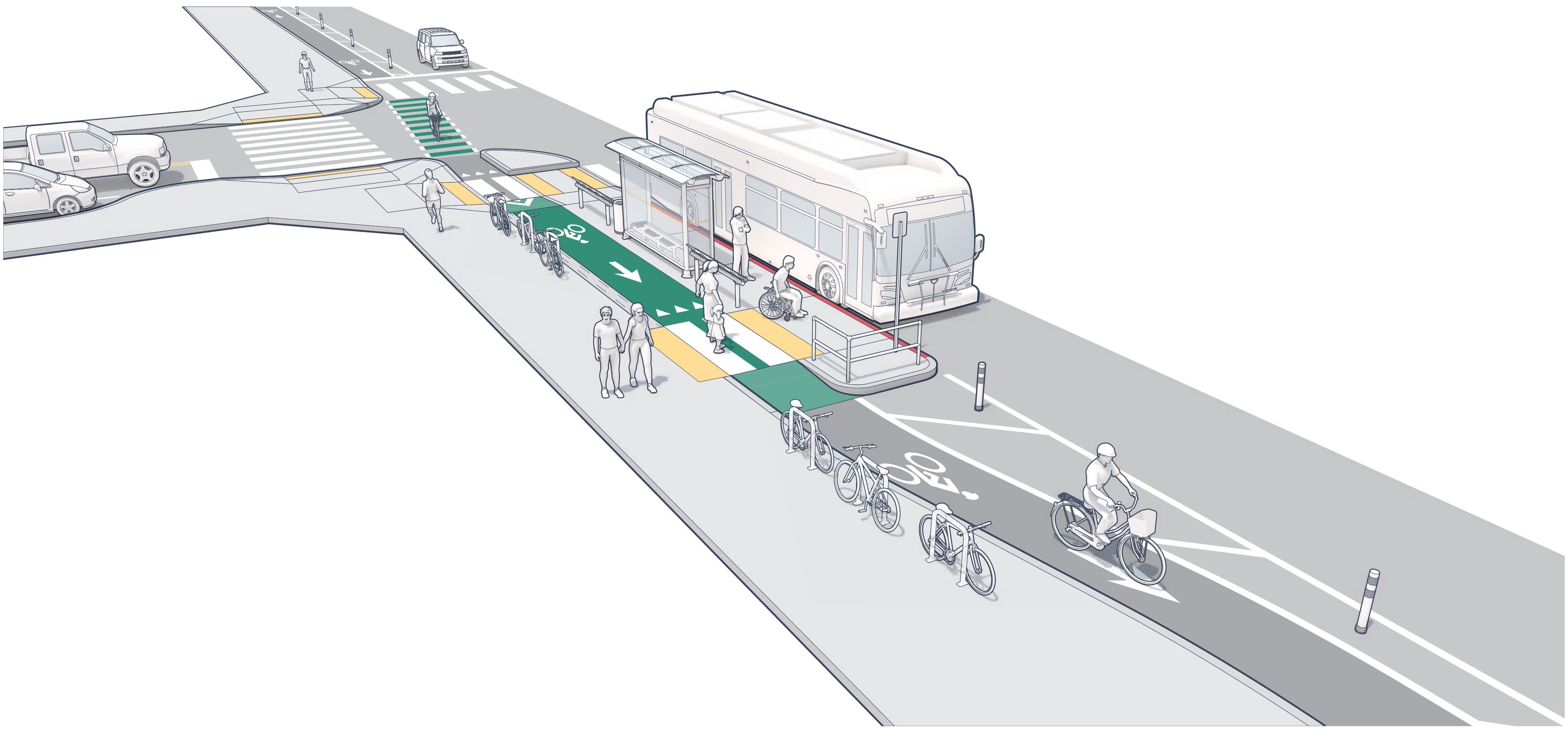
Table 6: Typology 3 Influence Area Minimum Dimensions

B. Typology 3: Plan View

1. Bus shelter (optional)
2. Accessible landing zone (min. 5' x 8')
3. Rear clear zone (11.5 x 8')
4. Green pavement (optional)
5. Bikes yield to peds sign (optional)
6. Bicyclist yield area
7. Bicycle ramp (max 1:12 slope)
8. Furnishing zone/Detectable edge
9. Bike lane taper (preferred 1:10 / max. 1:5)
10. Detectable warning surface
11. Vertical railing (optional)
12. Bus stop pole
13. Red curb zone (optional)



C. Typology 3: Perspective View



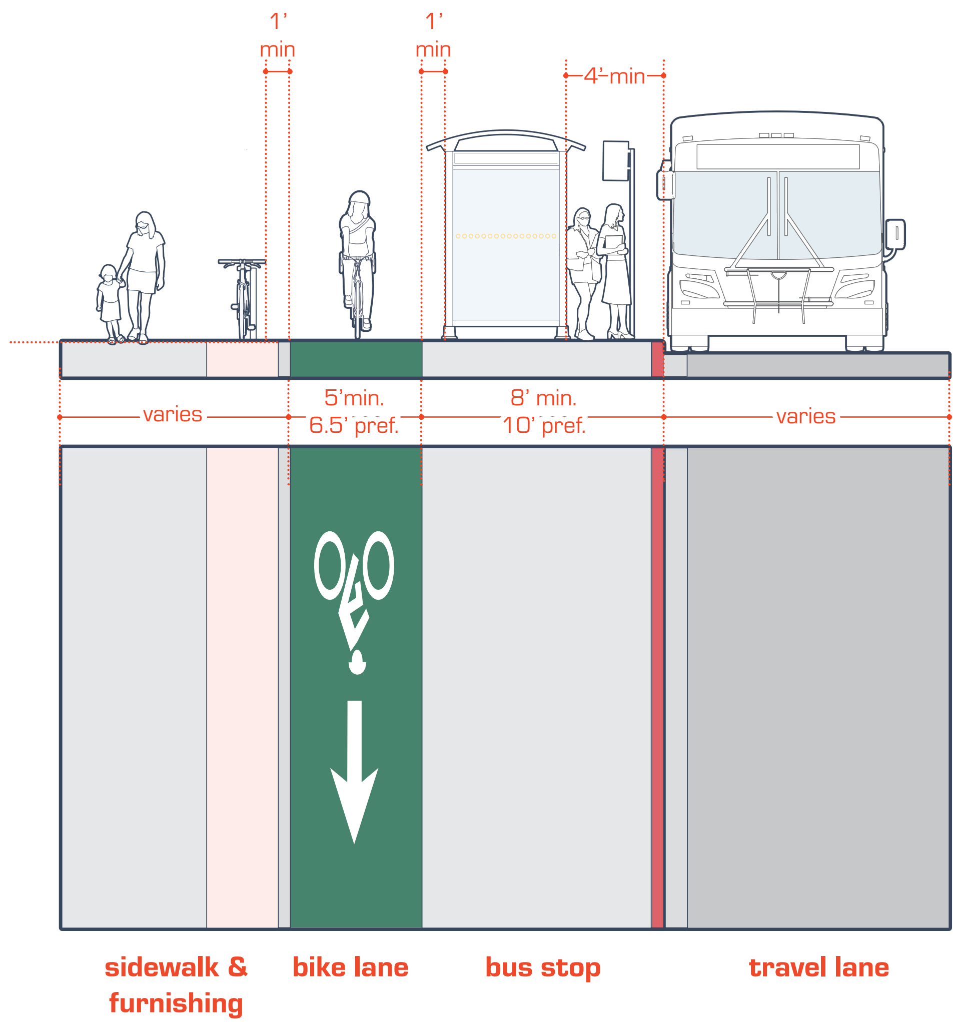
4.4 Typology 4
Class IV Bicycle Facility (Separated Bikeway) between the Curb and a Parking Lane

Typology 4's section view is also the same as the section views shown in Typologies 2 and 3.

A separated bikeway adjacent to parking can create a geometric cross section eliminating bikeway tapers through the intersection and exiting the floating bus platform area. Like Typologies 2 and 3, required, preferred, and optional design elements are annotated. The designer should consider the context of the area when including or excluding these design elements.

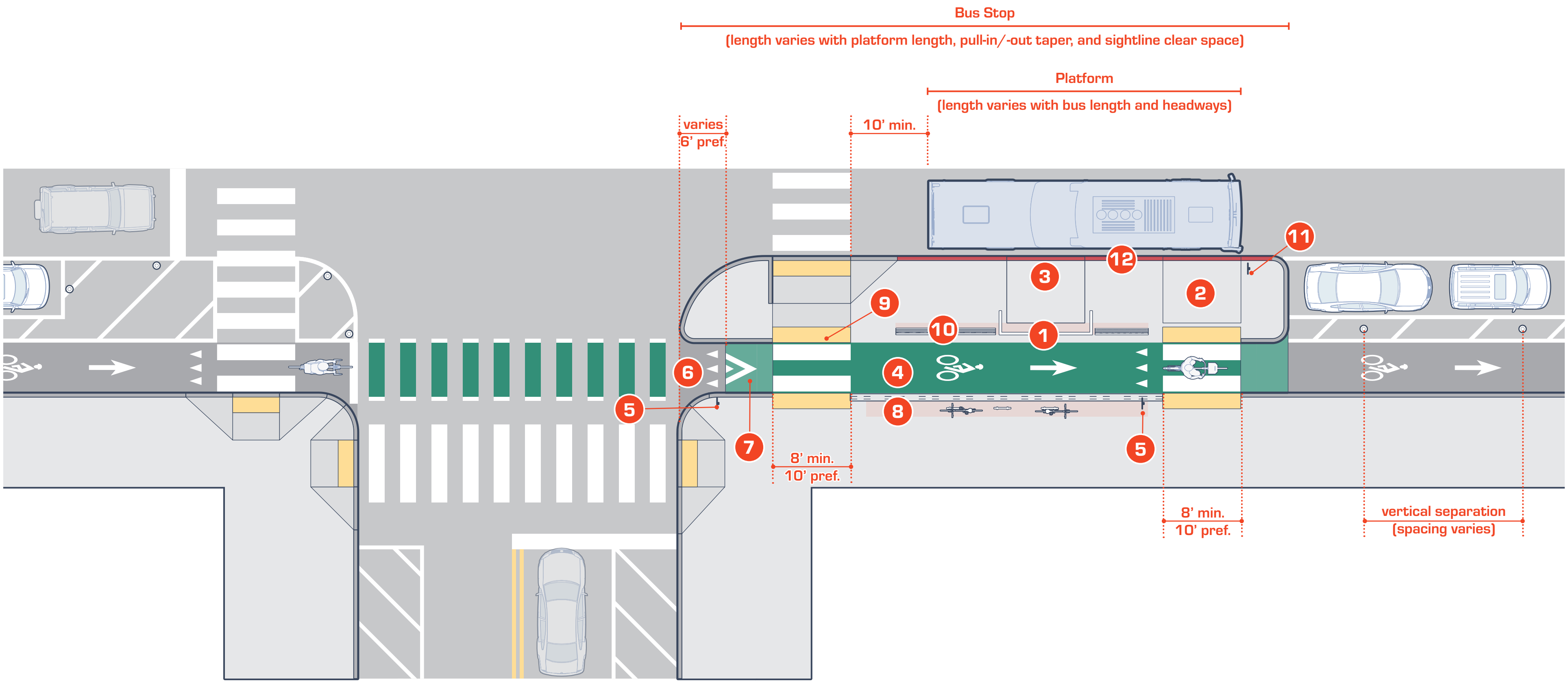
Table 7 provides guidance for these dimensions on Typology 4.

A. Typology 4: Section View

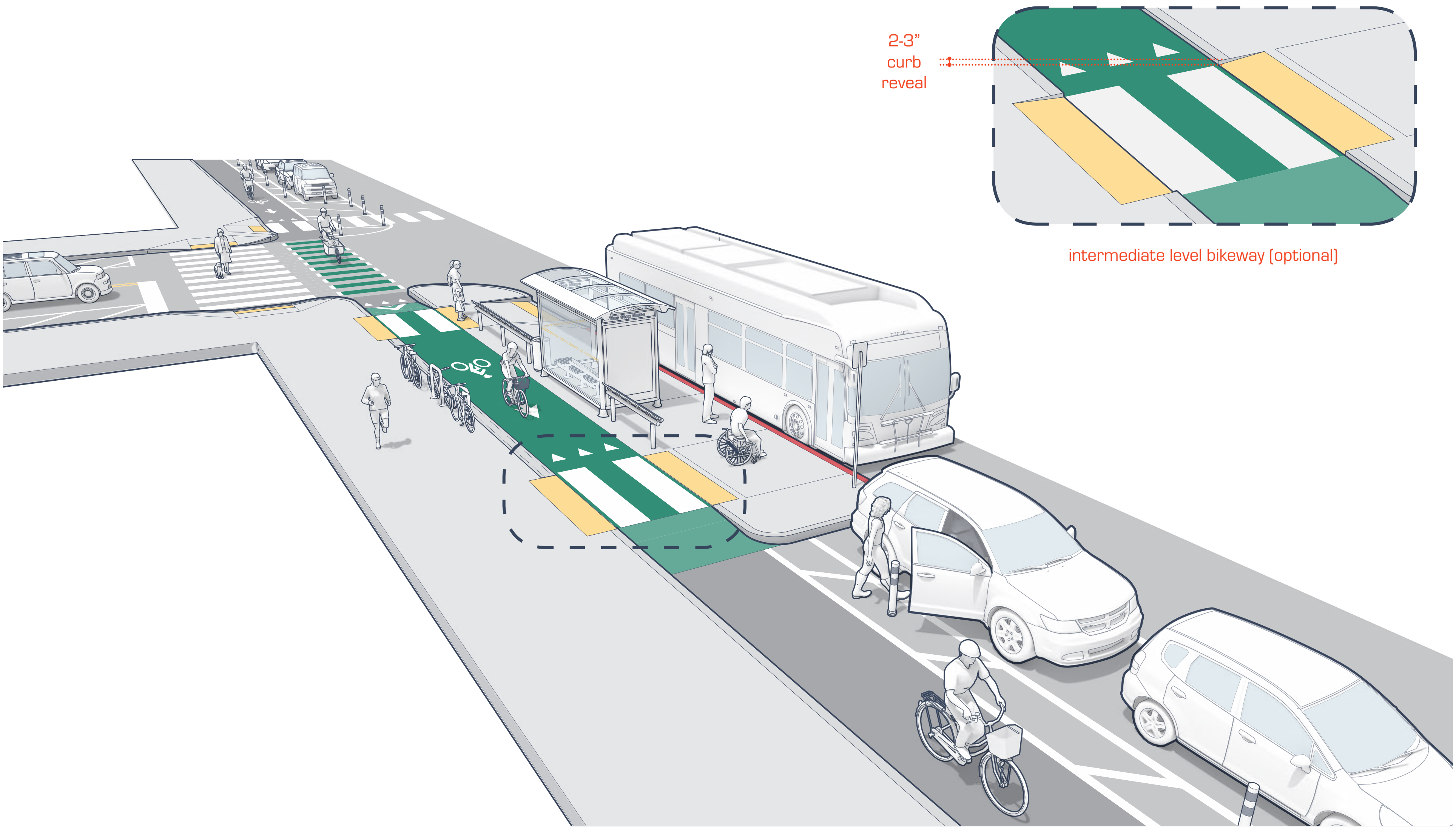


B. Typology 4: Plan View

1. Bus shelter (optional)
2. Accessible landing zone (min. 5' x 8')
3. Rear clear zone (11.5' x 8')
4. Green pavement (optional)
5. Bikes yield to peds sign (optional)
6. Bicyclist yield area
7. Bicycle ramp (max 1:12 slope)
8. Furnishing zone/Detectable edge
9. Detectable warning surface
10. Vertical railing (optional)
11. Bus stop pole
12. Red curb zone (optional)



C. Typology 4: Perspective View



	Arterial Speed Limit
	All Speeds
Bus Stop Island	
40' Bus	40'
60' Bus	60'
Two 40' Buses	120'
One 40' Bus and One 60' Bus	140'
Two 60' Buses	180'
Clearance from Crosswalk	
Far-side Bus Stop	10'
Near-side Bus Stop	10'
Mid-block Bus Stop	N/A

Table 7: Typology 4 Influence Area Minimum Dimensions

The perspective view of Typology 4 on the previous page features a callout diagram of an intermediate level bikeway design. A 2- to 3-inch curb reveal can be used to create an intermediate-level bikeway in lieu of a sidewalk-level bikeway adjacent to the floating bus stop island. There are several benefits and drawbacks of this optional design:

Benefits of Intermediate-level Bikeway Design

- **Vertical separation helps define the pedestrian and bicycle operating space. Cities with mature bicycling infrastructure regularly construct vertical separation between bicycle and pedestrian facilities.**
- **Decreased bike ramp length is needed between the street and bus platform level.**
- **The curb reveal provides a detectable edge between the sidewalk and the bikeway, eliminating the need for other longitudinal detectable elements. However, ADA-compliant ramps including detectable elements are required at pedestrian crossings of the bikeway.**

Drawbacks of Intermediate-level Bikeway Design

- **This design increases construction complexity.**
- **Drainage and maintenance of the bikeway in the bus stop platform area will require extra attention due to water pooling, leaf and debris buildup, etc.**

Importantly, curbs 4 inches or greater increase the risk of bicycle pedal strikes, so a 2- to 3-inch curb reveal is critical. Lastly, the 2- to 3-inch curb can be used in Typologies 2 through 5.

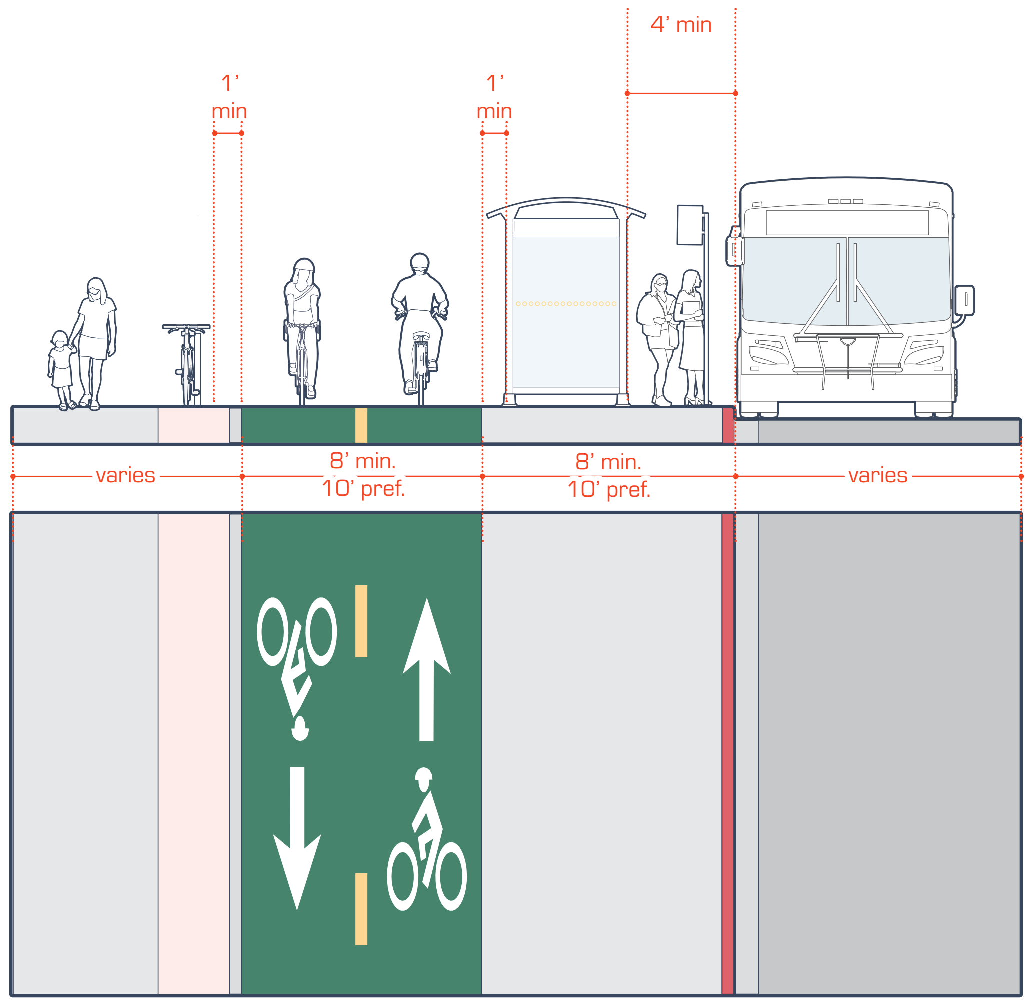
4.5 Typology 5
Class IV Bicycle Facility (Two-way Separated Bikeway) between the Curb and a Parking Lane

The cross section of Typology 5 uses the basic form of Typologies 2 - 4 where the bikeway is routed behind the floating bus stop platform and adjacent the sidewalk. Unique to Typology 5, the bikeway is designed for two-way travel, which necessitates increased minimum and preferred bikeway widths.

The plan view in Typology 5 illustrates fully curbed separated bikeway designs adjacent to parking. Again, there are many different vertical buffer treatments available to the designer, who should consider the context and constraints. When implementing Typology 5, special consideration should be given to increasing awareness of two-way bikeway travel at the floating bus stop platform. Signs, pavement markings, and other visual cues should be employed near the bus stop consistent with design guidance for two-way separated bike lanes.

Table 8 provides guidance for these dimensions on Typology 5.

A. Typology 5: Section View

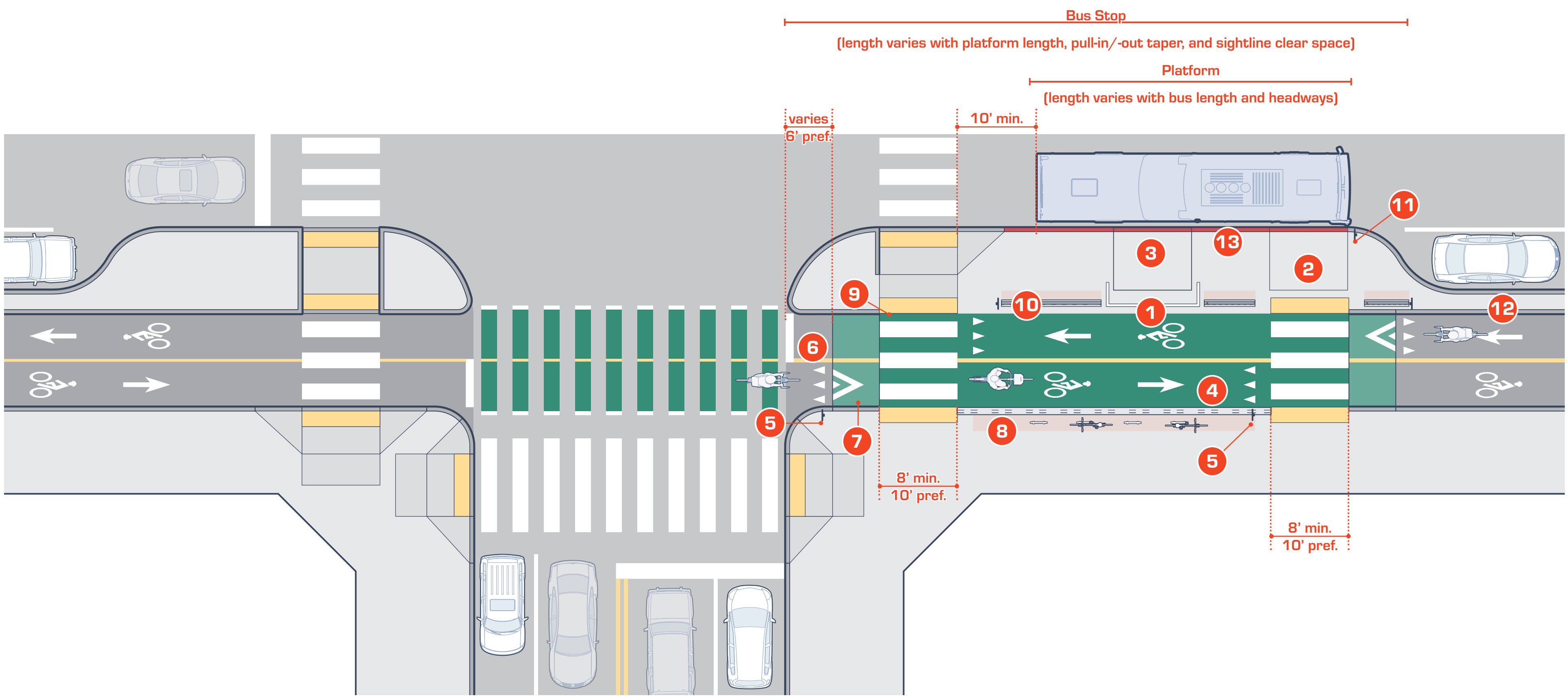


	Arterial Speed Limit
	All Speeds
Bus Stop Island	
40' Bus	40'
60' Bus	60'
Two 40' Buses	120'
One 40' Bus and One 60' Bus	140'
Two 60' Buses	180'
Clearance from Crosswalk	
Far-side Bus Stop	10'
Near-side Bus Stop	10'
Mid-block Bus Stop	N/A

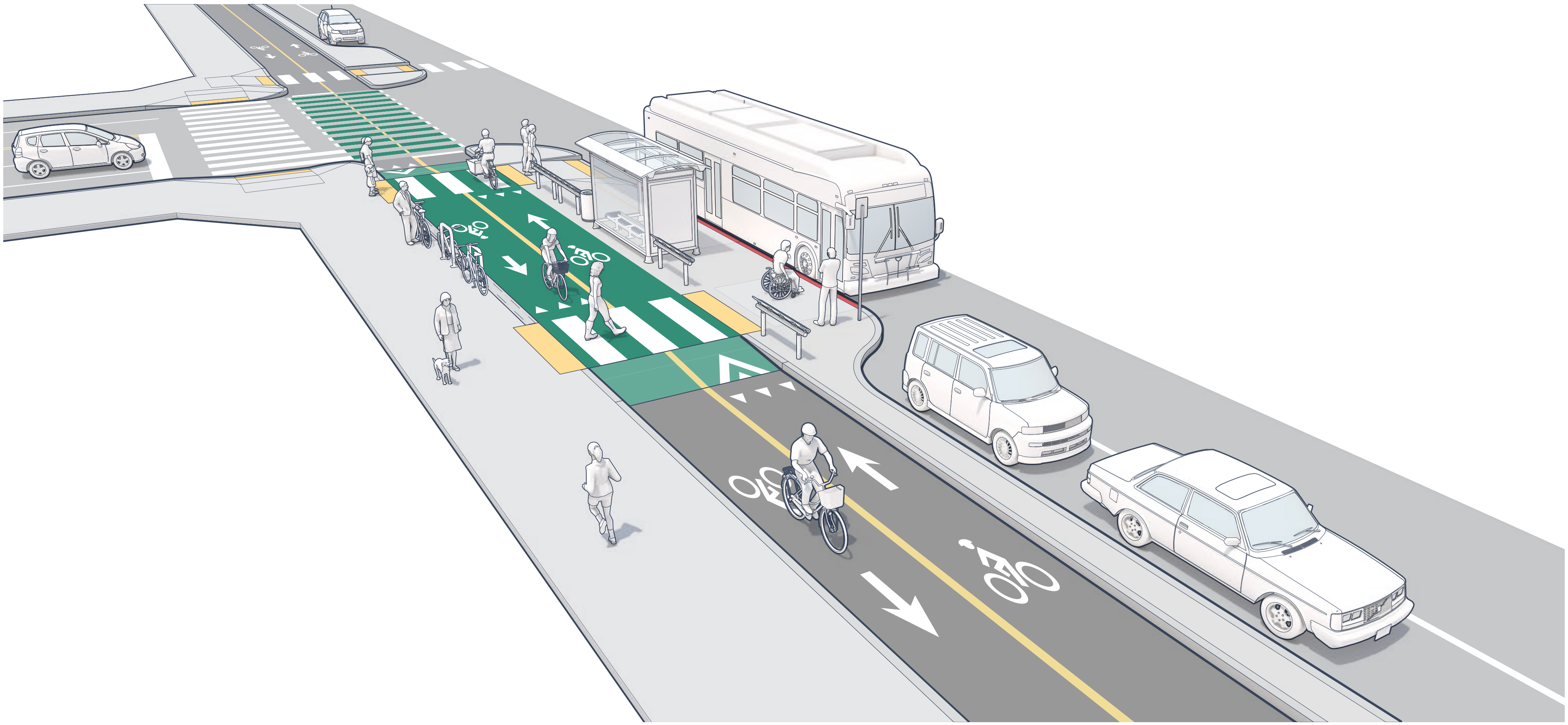
Table 8: Typology 5 Influence Area Minimum Dimensions

B. Typology 5: Plan View

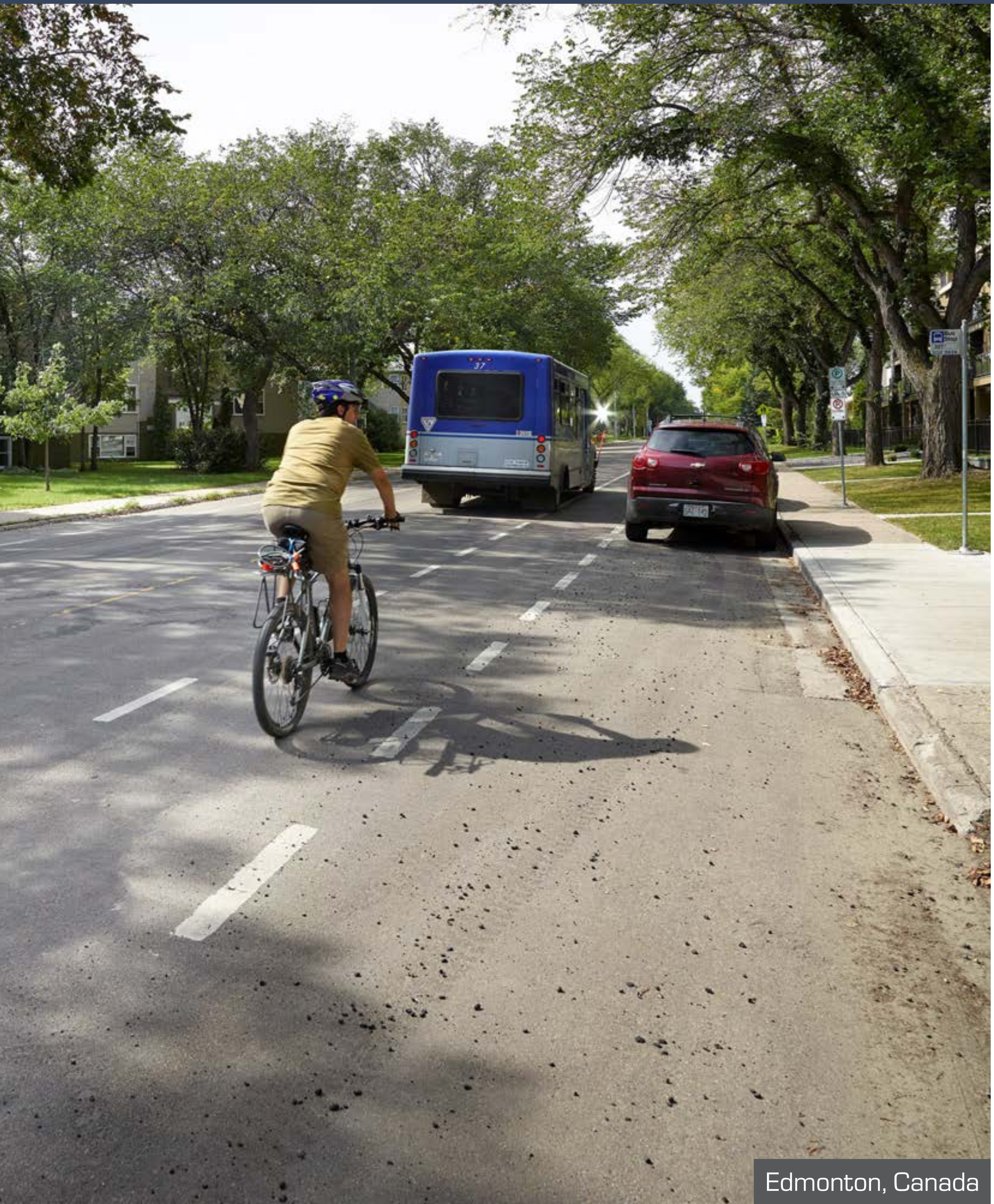
1. Bus shelter (optional)
2. Accessible landing zone (min. 5' x 8')
3. Rear clear zone (11.5' x 8')
4. Green pavement (optional)
5. Bikes yield to peds sign (optional)
6. Bicyclist yield area
7. Bicycle ramp (max 1:12 slope)
8. Furnishing zone/Detectable edge
9. Detectable warning surface
10. Vertical railing (optional)
11. Bus stop pole
12. Buffer treatment varies
13. Red curb zone (optional)



C. Typology 5: Perspective View



5.0 Typology Selection



Edmonton, Canada

Designing an appropriate bus stop depends on many factors including but not limited to the roadway configuration, posted/actual vehicle speeds, and bus passenger activity. Due to this contextual variability, it is possible to select multiple typologies on a single transit corridor. Subsequently, tailoring design elements for each bus stop will depend on site constraints, context, and local jurisdictional preference. While designers should strive for consistency, being flexible with the final design could result in a safer, more comfortable, and better-functioning bus stop for all users

5.1 Typology Selection Guidance

Selecting a typology is influenced by several factors:

- **Roadway classification**
- **Roadway constraints**
- **Traffic posted/actual speeds**
- **Vehicle volumes**
- **Bike volumes**
- **Bus volumes**
- **Passenger activity**

Choosing a bus stop typology based on the relationship between these factors is challenging because a local jurisdiction may prioritize some roadway uses over others. AC Transit is sensitive to these local priorities and encourages designers to consider these alongside the guiding principles presented in this Guide when selecting a typology and eventual bus stop design.

Guiding Principle 1 – The proposed roadway configuration should be the primary determinant in the choice of a typology.

The presence of vehicle lanes, parking, buffers, bike lanes, and other roadway elements may be the more static elements of a roadway configuration as compared with dynamic roadway characteristics such as posted speeds, user volumes, and passenger activity. The presence of a bike lane, separated bike lane, or two-way separated bike lane provides one filter of typology choice. The presence of parking is another important consideration in choosing a typology.

Also, some static objects within the roadway configuration are less permanent than others. Vehicle lanes, parking and design elements of the furnishing zone are commonly removed, rearranged, or re-sized to accommodate other uses. Removing or resizing vehicle lanes and/or parking spaces may be needed to provide appropriate entering/exiting tapers for the bikeway. If there are existing design elements such as bus shelters, they could be too large to fit into a new floating bus stop location based on the typology dimensions. The local jurisdiction should work with AC Transit to develop solutions to design issues considering the range of roadway users.

However, there are several unique roadway configurations which could make selecting a typology difficult:

- **Suburban/rural locations with no sidewalks**
- **Roadway configurations with mixed-traffic bicycle facilities**
- **Locations with exclusive bus lanes**
- **Roadways with angled parking**
- **Shared street**
- **Other roadway configurations**

In these cases, the stop location should be examined in detail and engineering judgment should be applied to develop a design solution that balances the needs of all roadway users.

Guiding Principle 2 – Floating bus islands are preferred for bus routes with headways of 15 minutes or less.

Floating bus islands have two types of bus operational benefits. When a bus approaches a floating bus stop, it does not need to exit and re-enter the vehicle lane to serve each request for boarding or alighting. Merging back into the travel lane can be challenging for bus operators due to motorists failing to yield to the merging movement. Eliminating this issue can lead to travel time savings, which translates into operational cost savings and improved travel experience for customers. The other operational benefit includes a designated area for passengers to wait for their bus. This additional space allows AC Transit, and potentially the local jurisdiction, to add further bus stop amenities to improve the passenger transit experience. Given a bus route with 15-minute headways, the operational and passenger benefits of floating bus islands may accumulate over a typical day and beyond.

Guiding Principle 3 – Floating bus islands are not preferred for roadways with posted speeds of 35 mph or higher.

Implementing a floating bus island means that a bus will stop in traffic and subsequently block traffic. With posted speeds of 35 mph or higher, a boarding/alighting event may create a safety issue between vehicles and bus operations. In these situations, a bus pull-out may be a more appropriate bus stop design treatment.

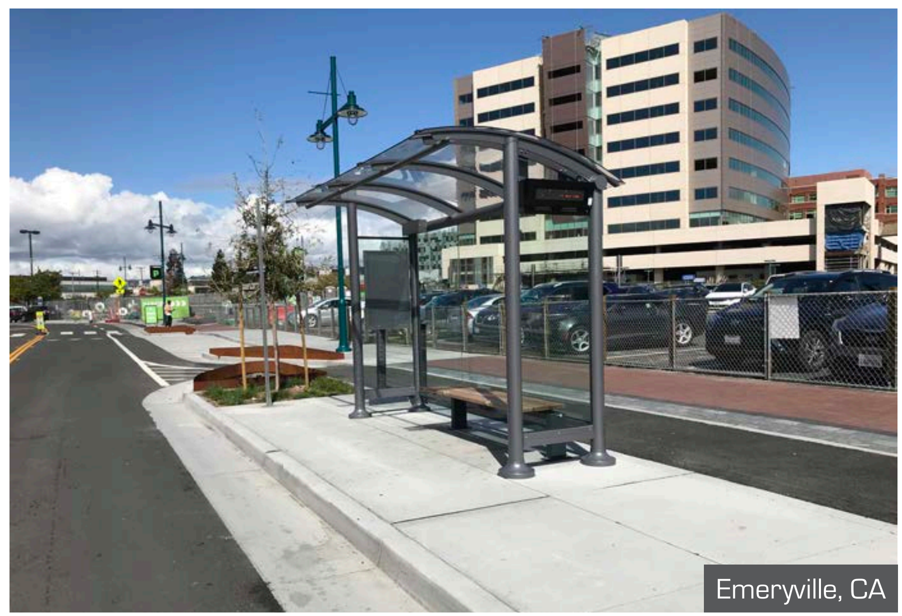
Consideration should be given to how bicyclists travel through a bus pullout. Bus pullouts may remove the bus completely from the vehicle and bike lane, allowing an unobstructed bicycle through movement. Designers should consider routing the bikeway behind the bus stop pullout, especially on higher speed roads and where bicycle through movements may be blocked by a stopped bus.

Where roadways have posted speeds of 35 mph or higher, separated bike lanes are recommended due to the increased risk bicyclists face on these types of roads. If separated bike lanes are implemented, their separation should be continued through a bus stop and potential bus pullout. In this situation, Typologies 3 to 5 may be appropriate to reference when designing the bus stop.

Guiding Principle 4 – A typology choice should incorporate future curbside use and future roadway configurations.

Choosing a typology could involve planning for future transit and/or roadway projects. AC Transit may make route enhancements or modifications in a corridor, and there could be changes to land use or other transit demand-related contexts. When these transit-related changes are being planned, changes to bus frequency could justify a floating bus stop at certain locations along the new route. Integrating an appropriate typology corresponding to the planned change may be especially important given the presence of bikeways and parking.

Local jurisdictions should consider floating bus stops when redesigning a corridor that carries an existing transit route and has existing bicycle facilities. Even if the transit route is low-frequency, designing the corridor with floating bus stops will allow for higher-quality bikeways and result in a safer, more balanced, comfortable, and functional corridor.


Emeryville, CA

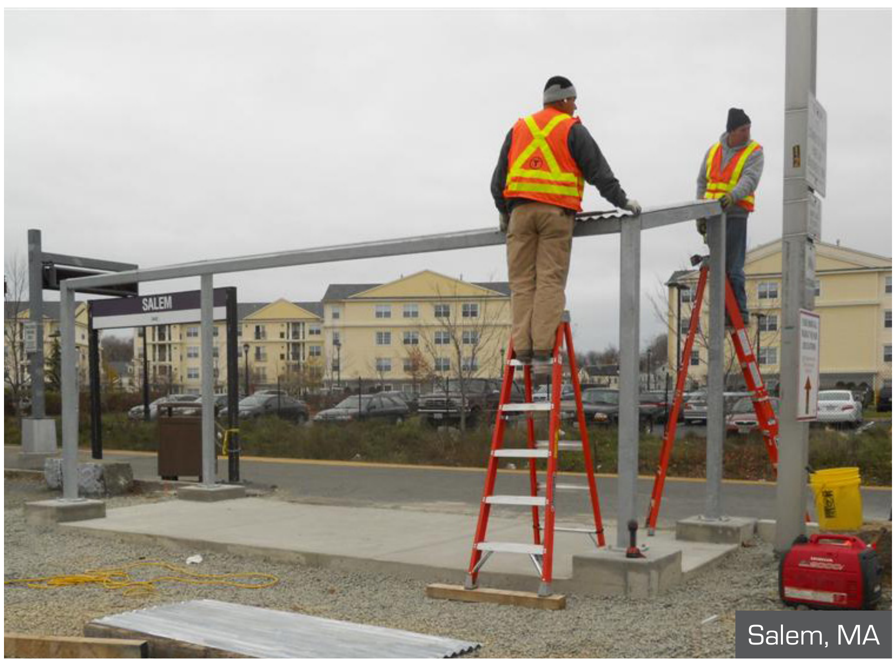
6.0
Maintenance Considerations

Washington, D.C.

Bus stop locations are typically on the edge of the roadway corridor and located in densely populated environments which accumulate debris during all seasons. Providing and implementing an effective maintenance program ensures continuity throughout the system.

Bus stops require routine maintenance to ensure functionality and provide a pleasant environment for all users. Litter can accumulate at bus stops and trees or other vegetation may drop foliage regularly or seasonally. Vandalism can also occur and should be remedied. Regular, seasonal, and as-needed maintenance agreements should be established with local jurisdictions or property owners. Some of these maintenance costs can be offset with bus stop and bus-related advertising.

Floating bus stops have special maintenance considerations because of the channelization created for the bikeway route. Bikeways may catch debris, dirt, and leaves, which should be swept on a regular or seasonally. Leaves, especially when wet, are very slippery and can create hazards for bicyclists passing through the area. Bus stop maintenance workers can use a variety of techniques to keep these areas clean, including hand sweeping, pressure washing, small hand-operated machines, or narrow maintenance vehicles.



Salem, MA

Lastly, bus stops should be regularly inspected and the quality of design elements should be noted over time as they slowly deteriorate and lose their colorful luster. Inspecting and inventorying design elements could yield valuable information on longevity, replacement, and cost expectations. The information could then be used to investigate more robust design elements to be installed for existing or future bus stops.

7.0
Reference Endnotes

Berkeley, CA

Reference Endnotes

[1] Highway Design Manual, 6th Edition. Caltrans. 2017

[2] California Manual on Uniform Traffic Control Devices. State of California. Caltrans. California State Transportation Agency. 2014.

[3] Bus Stop Policy. AC Transit. Policy No. 508 Board Policy. Adopted 1989, Amended 2005.

[4] Designing with Transit: Making Transit Integral to East Bay Communities. AC Transit. 2004.

[5] Central County Complete Streets Design Guidelines. Alameda County Transportation Commission. 2016.

[6] Guide for the Development of Bicycle Facilities, 4th edition. American Association of State Highway Transportation Officials. 2012.

[7] Urban Street Design Guide. National Association of City Transportation Officials. 2013.

[8] Transit Street Design Guide. National Association of City Transportation Officials. 2016.

[9] Urban Bikeway Design Guide. National Association of City Transportation Officials. 2014.

[10] Manual on Uniform Traffic Control Devices. Federal Highway Administration. 2009 Edition.

[11] Rhode Island Bus Stop Design Guide. Rhode Island Public Transit Authority. 2017.

[12] Transit Cooperative Research Program Report 65: Evaluation of Bus Bulbs. Fitzpatrick, et al. Transportation Research Board, Washington DC. 2001.

[13] Service Standards and Design Policy. AC Transit. Policy No. 550 Board Policy. Adopted 1994, Amended 2004, 2008.

[14] Essentials of Bike Parking: Selecting and Installing Bike Parking that Works. Association of Pedestrian & Bicycle Professionals. 2015.

[15] Roadway Lighting RP-8-14. Illuminating Engineering Society. 2014.

[16] A Summary of Design, Policies, and Operational Characteristics for Shared Bicycle/Bus Lanes. Florida Department of Transportation Research Center. 2012.

[17] Design Information Bulletin Number 89. Class IV Bikeway Guidance (Separated Bikeways/Cycle Tracks). California Department of Transportation (Caltrans). 2015.

Kate Harrison
Councilmember, District 4

ACTION CALENDAR
June 27, 2023

To: Honorable Mayor and Members of the City Council

From: Councilmember Harrison

Subject: Adopt an Ordinance Adding Chapter 12.39 to the Berkeley Municipal Code to Regulate Deconstruction and Construction Materials Management

RECOMMENDATION

1. Adopt an ordinance adding Chapter 12.39 to the Berkeley Municipal Code to regulate management of deconstruction and construction materials.
2. Refer to the November 2023 Budget AAO Process $[x] to administer and enforce the ordinance.
3. Refer to the City Attorney's Office to conduct a nexus fee study for a potential social cost of carbon fee applied to landfilled construction and demolition debris.

CURRENT SITUATION, EFFECTS, AND RATIONALE FOR RECOMMENDATION

The accumulation, collection, removal and disposal of waste associated with construction, deconstruction and demolition activities needs to be regulated for the protection of the public health, safety and welfare, climate and natural environment.

According to the World Green Building Council, 11% of all energy-related carbon emissions result from building materials and construction activities.[1] These emissions are often referred to as "embodied carbon," which the International Code Council defines "the carbon emissions released during the extraction, manufacturing, transportation, construction and end-of-life phases of buildings."[2]

Emissions are not only embodied in new construction materials and activities, but also in those of the past. The current built environment represents the physical manifestation of past greenhouse gas emissions (GHGs), and given the imperative of rapidly reducing GHGs, such material must be prioritized for preservation, or reuse. Every part of the built environment, whether constructed with ancient redwood timber in the nineteenth century or Canadian Douglas fir and pine in the twenty-first, must be considered and valued

[1] "Bringing Embodied Carbon Upfront." World Green Building Council, 25 Jan. 2023, https://worldgbc.org/article/bringing-embodied-carbon-upfront/.
[2] "Embodied Carbon." ICC, 11 May 2021, https://www.iccsafe.org/advocacy/embodied-carbon/.

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info

within the context of cumulative historic emissions and dwindling and nearly expired carbon budgets.

State law imperfectly addresses the end-of-life phases of buildings through the California Integrated Waste Management Act of 1989 and the California Green Building Code, which requires local governments to require fifty percent of construction debris be diverted from the landfill. Senate Bill 1374 further requires annual reporting to the state on progress made in the diversion of construction related materials, including information on programs and ordinances implemented and quantitative data, where available. In 2016, of Berkeley’s total waste stream, 10% was from construction and demolition materials. As discussed below, this number is now likely much higher given the recent uptick in construction.

Additional required minimum diversion rates by project type are covered under the California Green Building Code and the City's local amendments in BMC Title 19 (2019), Buildings and Construction. As a minimum, the latest State code requires 65% of non-hazardous construction and demolition (C&D) waste to be reused *or* recycled. In addition, the State also requires recycling or reuse of 100% of excavated soil and land-clearing debris, concrete, and asphalt. Current requirements include a “Construction Waste Management Plan” survey and requirement to provide receipts of recycled and salvaged material. The extent of enforcement is unclear.

Existing laws fall short because there is no state or local requirement that requires property owners or developers to work with the City to develop an accountable plan to carefully take apart a building to maximize reusable materials, whether onsite or through a salvaging operation. In addition, recycling, an allowed alternative to reuse of demolition materials may not maximize capturing embodied carbon. For example, State law includes loopholes that allow a certain percentage of demolition materials to be ‘recycled’ as a cover to layers of trash in landfills.

This proposed ordinance aims to implement best practice methods for separation, handling, and delivery of deconstruction and construction site materials to maximize the salvage of building materials for reuse, to reduce the amount of C&D related materials disposed in landfills and to establish deconstruction and source separation requirements.

Other jurisdictions, such as Palo Alto and Portland, have implemented similar deconstruction ordinances. To protect public health, safety and welfare, climate and natural environment, it is in the public interest to adopt this ordinance.

BACKGROUND

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info

In 2021, the World Green Building Council warned that by 2050 “the [global] building stock is expected to double in size. Carbon emissions released before the built asset is used, referred to as ‘upfront carbon’, will be responsible for half of the entire carbon footprint of new construction between now and 2050, threatening to consume a large part of our remaining carbon budget.”[3] Viewed over the next 10 years, the window scientists view as critical to limiting catastrophic warming emissions, new embodied carbon represents a significant 72% of total building sector emissions.[4] Much of these emissions include those associated with the demolition of existing buildings and the new buildings that replace them.

Buildings Magazine, a trade magazine for facility managers and owners of commercial and public buildings, estimates that already an astounding 30% of all waste in the United States is construction and demolition waste. New construction is associated with an average of 3.9 pounds of waste per square foot while demolition yields an astounding 155 pounds of waste per square foot.[5]

When a building is haphazardly demolished to make way for new construction, not only are carbon emissions typically expended to tear it down and transport it for waste processing and disposal, but the former building, composed of many tons of carbon emissions and products arranged in a form useful to society, is rendered useless as waste, or much less useful to society as recyclable material. Instead, the builder replaces the demolished structure with new embodied carbon in constructing the new building, which generates new waste and additional emissions.

According to a 2011 study, even assuming a 30% increase in efficiency resulting from a newly constructed building, it takes 10 to 80 years for the newer and more efficiently operating building to ‘break even’ or offset the negative carbon impacts associated with replacing an average-performing existing building (not accounting for the “lost” carbon originally embodied in the original building).[6] The following figure demonstrates the

---

[3] “Bringing Embodied Carbon Upfront.”

[4] Logan, Katharine. “Continuing Education: Embodied Carbon & Adaptive Reuse.” Architectural Record RSS, Architectural Record, 25 May 2022, https://www.architecturalrecord.com/articles/15481-continuing-education-embodied-carbon-adaptive-reuse.

[5] Monroe, Linda. Diverting Construction Waste | Buildings. https://www.buildings.com/department/article/10192921/diverting-construction-waste; See also, Sahabi, Ali. “Structural Retrofits Reduce the Carbon Footprint (Part 2 of 3) - USGBC-La.” USGBC, 25 Feb. 2023, https://usgbc-la.org/2023/02/09/structural-retrofits-reduce-the-carbon-footprint-part-2-of-3.

[6] “National Trust for Historic Places: Return to Home Page.” The Greenest Building: Quantifying the Environmental Value of Building Reuse, Preservation Green Lab of the National Trust for Historic Preservation, 2011, https://forum.savingplaces.org/connect/community-home/librarydocuments/viewdocument?DocumentKey=227592d3-53e7-4388-8a73-

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info

number of years required in Portland and Chicago for various forms of newly constructed efficient buildings replacing demolished inefficient buildings to 'break even' with or 'overcome' the new emissions associated with new construction (note: this figure does not include embodied emissions wasted as part of the original construction):

Year Of Carbon Equivalency For Existing Building Reuse Versus New Construction

This study finds that it takes between 10 to 80 years for a new building that is 30 percent more efficient than an average-performing existing building to overcome, through efficient operations, the negative climate change impacts related to the construction process. This table illustrates the numbers of years required for new, energy efficient new buildings to overcome impacts.

Building Type	Chicago	Portland
Urban Village Mixed Use	42 years	80 years
Single-Family Residential	38 years	50 years
Commercial Office	25 years	42 years
Warehouse-to-Office Conversion	12 years	19 years
Multifamily Residential	16 years	20 years
Elementary School	10 years	16 years
Warehouse-to-Residential Conversion*	Never	Never

*The warehouse-to-multifamily conversion (which operates at an average level of efficiency) does not offer a climate change impact savings compared to new construction that is 30 percent more efficient. These results are driven by the amount and kind of materials used in this particular building conversion. As evidenced by the study's summary of results, as shown on page VII, the warehouse-to-residential conversion does offer a climate change advantage when energy performance for the new and existing building scenarios are assumed to be the same. This suggests that it may be especially important to retrofit warehouse buildings for improved energy performance, and that care should be taken to select materials that will maximize environmental savings. [7]

Since 2011, the advent of new insulation and electrification technologies make renovating or adapting older buildings more competitive in terms of reducing existing onsite carbon emissions.[8] This ordinance takes the perspective that both the carbon avoided by reusing existing materials (as in the examples above) and the carbon used in the original construction need to be considered as impacts of C&D and be accounted for in addressing the climate emergency. In other words, existing buildings represent

c2861f1070d8&CommunityKey=00000000-0000-0000-0000-000000000000&tab=librarydocuments, p. VIII.

[7] Id.

[8] Id., p. 20

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info

historic expenditures of carbon and demolition needs to be seen as both destroying the usefulness of past emissions and *contributing new emissions*.

The greenest building is the one that already exists.[9] The best way to avoid new carbon emissions, and to repurpose or restore the use value of existing emissions, is to preserve and renovate existing structures. To the extent that new or additional uses are needed, e.g., converting a single-family home into a multiplex, the lowest carbon path is to maintain as much of the original structure as possible with expansions and modifications as needed. Such a strategy maintains the integrity of the historic embodied carbon, and minimizes expenditure of new carbon emissions. For example, UC Berkeley's new Engineering Center includes adaptive reuse which UC states "will significantly lower the carbon emissions of the project, including more than a 90% reduction in demolition."[10]

A 2021 study conducted by ECONorthwest found that "conservatively speaking, residential and commercial demolitions in the City of Portland are responsible for 124,741 metric tons of CO_2 emissions per year, which amounts to approximately 4.5 percent of the City's total annual [emissions] reduction goal."[11]

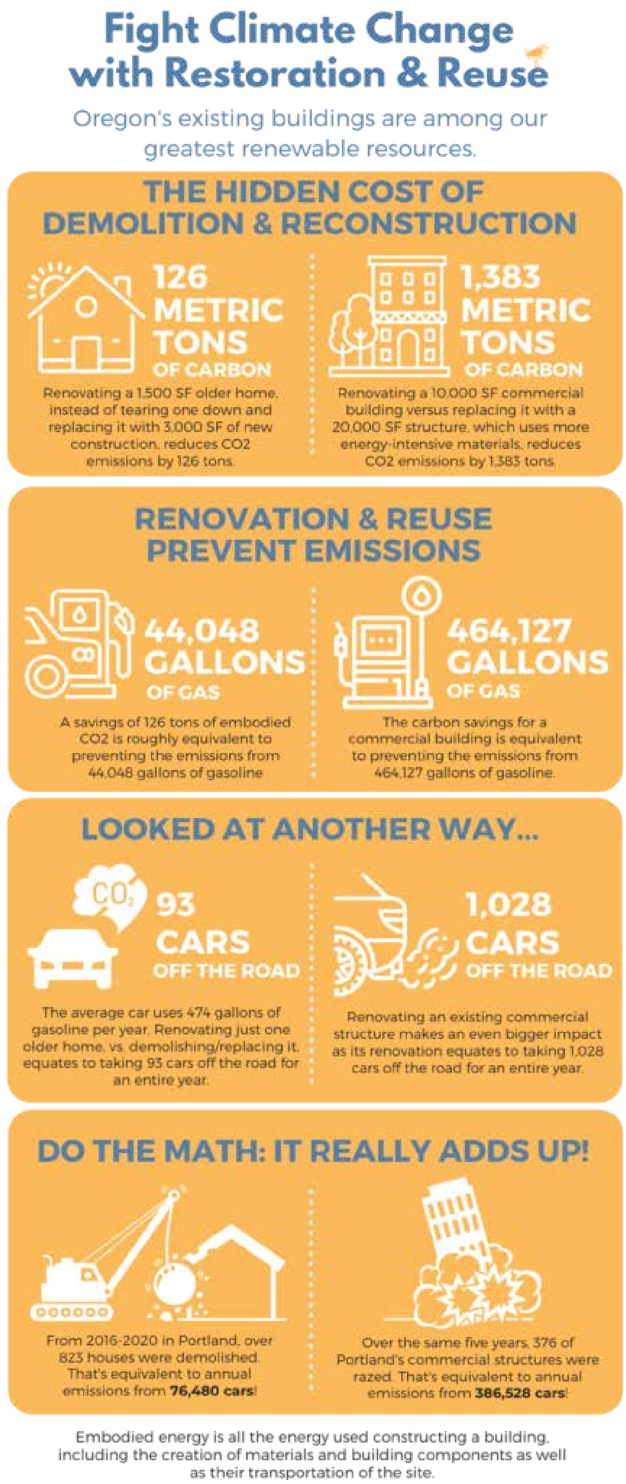
---

[9] Adam, Robert. "'The Greenest Building Is the One That Already Exists.'" The Architects' Journal, 13 Aug. 2021, https://www.architectsjournal.co.uk/news/opinion/the-greenest-building-is-the-one-that-already-exists.

[10] "Engineering Center." *Berkeley Engineering*, 2 May 2023, engineering.berkeley.edu/about/facilities/engineering-center/.

[11] Oregon, Restore. "Understanding the Carbon Cost of Demolition." Restore Oregon, 1 Oct. 2021, https://restoreoregon.org/2021/04/12/understanding-the-carbon-cost-of-demolition/.

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info



12

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info

City of Berkeley's Current Construction and Demolition Waste

A 2017 StopWaste Waste Characterization Study for Alameda County found that approximately 10% of Berkeley's total waste tonnage in 2016 resulted from C&D debris.[13]

2017 Waste Characterization Study Design | SCS ENGINEERS

StopWaste of Alameda County, CA

Exhibit 2. 2016 Annual Waste Quantities – Adjusted

Originating Jurisdiction	MSW						C&D			Special				Unknown	Total
	Davis Street TS	Berkeley TS	BLT Ent TS	Altamont LF	Vasco Rd LF	TOTAL	Davis Street TS	Altamont LF	TOTAL	Davis Street TS	Altamont LF	Vasco Rd LF	TOTAL	Vasco Rd LF	
Alameda	23,417	36			344	23,796	1,283	135	1,418		355	14	369		25,583
Albany	3,567	364			2	3,933	1,023		1,023		0		0		4,956
Berkeley	2,091	47,014		171	76	49,352	5,269	5	5,274		432	11	443		55,069
Castro Valley SD	INCLUDED IN Alameda Unincorporated														
Dublin	51			28,591	1,602	30,244	25	41	66		97	60	158		30,468
Emeryville	5,873	166			16	6,056	3,051		3,051		349	2	351		9,457
Fremont	417		156,167	2	918	157,503	229	127	356		305	347	652		158,510
Hayward	78,374	233	7	104	1,341	80,058	20,320	190	20,510	290	1,915	264	2,468		103,036
Livermore	100			284	58,923	59,307	88	2,063	2,151		562	601	1,163		62,621
Newark	69		28,946	0	39	29,054	34	2	36		0	225	225		29,315
Oakland	148,509	7,635		76	3,451	159,671	21,664	242	21,905		7,430	434	7,864		189,441
Oro Loma SD	INCLUDED IN Alameda Unincorporated														
Piedmont	39	135			9	183	69		69		17		17		269
Pleasanton	158			8	94,690	94,856	297	985	1,282		203	403	606		96,744
San Leandro	31,752	213		50	39,003	71,018	5,513	10	5,523	4,231	375	389	4,994		81,535
Unincorporated	25,713	175		756	3,236	29,879	3,471	185	3,656	358	1,164	181	1,703	262	35,499
Union City	791		34,342	2	69	35,204	74	2	76		399	2,318	2,717		37,998
Total	**320,920**	**55,971**	**219,462**	**30,043**	**203,719**	**830,114**	**62,411**	**3,986**	**66,397**	**4,879**	**13,602**	**5,250**	**23,731**	**262**	**920,503**

1. Removed 4,000 tons of Special Waste disposed at at Altamont Landfill from City of Alameda
2. Removed 18,800 tons of MSW disposed of at Berkeley TS from City of Berkeley
3. Removed 20,662 tons o f MSW disposed of at Altamont LF from City of Newark; and removed 27,357 tons of Special Waste disposed of at Altamont LF from City of Newark

14

This study predates the recent building boom associated with new local and statewide housing policies, economic developments, and COVID-19 related renovation trends. It may also not capture cross-jurisdictional disposal of waste.

A snapshot for the twelve months preceding April, 2023 suggests a substantial increase in C&D as compared to StopWaste's 2016 study. As reported through the City's Green Halo Systems dashboard, C&D waste was more than 18,000 tons, a staggering 244% increase from 2016 levels. Of this material, the City reported that only 567 tons were

---

[12] Id.

[13] "Alameda County 2017-18 Waste Characterization Study." StopWaste - A Public Agency Reducing Waste in Alameda County, StopWaste, 5 Sept. 2018, https://www.stopwaste.org/resource/alameda-county-2017-18-waste-characterization-study.

[14] Id.

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info

reused while 2,530 tons were disposed (landfill), and 15,073 recycled.[15] The distribution of materials within each distinct material category is not clear. The Green Halo dashboard summarizes overall C&D by category over the same period as follows:

	MATERIAL	IN TONS	RATE
1	Concrete	10,839.63	58.74%
2	Mixed C & D Debris	4,762.22	25.80%
3	Asphalt - Pavement & Grinding	661.01	3.58%
4	Deconstructed & Reuse Items	567.24	3.07%
5	Bricks, Masonry & Stone Products	474.15	2.57%
6	Dirt/Soil-Clean Fill	320.97	1.74%
7	Metal	286.43	1.55%
8	Waste (Trash)	207.81	1.13%
9	Drywall - Clean/Unpainted	198.87	1.08%
10	Wood - Clean	136.52	0.74%

[16]

City of Berkeley's Current Approach to C&D Waste

In furtherance of state law regulating C&D debris,[17] the Building and Safety Permit Service Center currently maintain a "Construction Waste Management Plan"[18] form applicable to the following projects:

1. Any non-residential projects requiring building permits.
2. Residential new buildings.
3. Residential projects that increase a building's conditioned area, volume, or size.
4. Residential projects valued over $100,000.
5. Demolition permits valued over $3,000.

Projects are asked to disclose generally which methods they intend to use to reduce waste during construction:

[15] City of Berkeley Recycling Center, City of Berkeley, Powered by Green Halo Systems and City of Berkeley, 5 Apr. 2023, https://berkeley.wastetracking.com/.

[16] Id.

[17] A minimum of 65% of the waste generated by construction and demolition activities must be diverted away from landfill disposal through any combination of recycling, salvage, reuse or composting. 100% of asphalt, concrete, and land clearing debris must be recycled.

[18] Form #172 Construction Waste Management Plan - Berkeley, California. Building and Safety Permit Service Center, 19 Mar. 2021, https://berkeleyca.gov/sites/default/files/2022-02/Waste%20Management%20Plan.pdf.

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info

Construction Methods

The following methods will be used to reduce waste generated during construction:

- ☐ Efficient design
- ☐ Careful and accurate material ordering
- ☐ Careful material handling and storage
- ☐ Panelized or prefabricated construction
- ☐ Deconstruction/salvage/reuse
- ☐ Other: ____________ [19]

Applicants then complete a more detailed “Construction Waste Management Plan” through the Green Halo web platform.

In addition, the form asks for information about weight tickets for disposed and recycled materials and photos of any salvaged/reused materials. This data is then uploaded and processed via the City’s Green Halo dashboard.

Diversion Documentation

Submit a Construction Waste Management Plan via Green Halo at www.berkeley.wastetracking.com. Prior to permit final, weight tickets for all materials disposed and recycled must be uploaded. Photos are acceptable for salvaged/reused materials.

Green Halo Tracking Number: ____________

I understand the waste diversion requirements of Berkeley Municipal Code Section 19.37 and submit this Construction Waste Management Plan pursuant to California Green Building Standards Code Section 4.408.2 or 5.408.1.1.

Name	Signature	Date

[20]

Ordinance Overview: New Requirements

Drawing inspiration from neighboring jurisdictions such as Palo Alto and Portland, the proposed ordinance moves beyond the state’s simple percentage-based diversion, recycling, and reuse requirements, and towards defining specific building components that are potentially reusable and requiring a salvage survey provided by the City, a reuse organization, or other third party approved by the City. These reporting requirements would need to be met prior to the issuance of a demolition permit. The survey is aimed at itemizing the potential materials and items eligible for salvage and reuse and the estimated weights, preparing the builder for source separation, and connecting builders directly to salvaging experts who may be able to connect the builder to organizations

[19] Id.

[20] Id.

who can accept or purchase their material for reuse. The size threshholds would remain the same as in the current statute.

This approach is more proactive than state rules, which rely on the judgment of the builder, to avoid incentivizing (1) more destructive techniques of traditional demolition, and (2) recycling instead of reuse. In addition, the City now only requires the builder to self-certify that disposed material was diverted after demolition occurs (as opposed to a detailed site survey that estimates weights before demolition occurs).

The ordinance also requires deconstruction, which is defined as “the systematic and careful dismantling of a structure, typically in the opposite order it was constructed, in order to maximize the salvage of materials and parts for reuse and recycling.”

Upon completion of the deconstruction and source separation of materials, the applicant or person responsible for the project shall ensure the items listed on the salvage survey are delivered to, collected by or received by, and certified by a reuse organization or other third party approved by the City, and shall submit to the City proof of delivery of salvage items in accordance with City regulations. This process creates a chain of custody of environmentally, labor, and carbon intensive resources, and incentivizes builders to prioritize designs and projects that minimize demolition in favor of adaptation.

In addition, this item includes a referral to the City Attorney’s office to conduct a nexus fee study in connection with a potential social cost of carbon fee applied to landfilled construction and demolition debris.

FISCAL IMPLICATIONS
Staff time will be needed to administer and enforce the ordinance, and to coordinate with approved salvage operations.

ENVIRONMENTAL SUSTAINABILITY
Restoring or adapting embodied carbon in buildings is significantly less carbon intensive than demolition and new construction. In instances where restoration and adaptation are not feasible, reuse of materials through deconstruction is superior to traditional demolition techniques.

CONTACT PERSON
Councilmember Kate Harrison, Council District 4, (510) 981-7140

2180 Milvia Street, Berkeley, CA 94704 ● Tel: (510) 981-7140 ● TDD: (510) 981-6903 ● Fax: (510) 981-6903 E-Mail: KHarrison@cityofberkeley.info

ORDINANCE NO. –N.S.

ADDING CHAPTER 12.39 TO THE BERKELEY MUNICIPAL CODE TO REGULATE DECONSTRUCTION AND CONSTRUCTION MATERIALS MANAGEMENT

BE IT ORDAINED by the Council of the City of Berkeley as follows:

Section 1. That Chapter 12.39 of the Berkeley Municipal Code is added to read as follows:

Chapter 12.39

DECONSTRUCTION AND CONSTRUCTION MATERIALS MANAGEMENT

Sections:

12.39.010 Findings and purpose.

The Council of the City of Berkeley finds and declares as follows:

A. The accumulation, collection, removal and disposal of waste associated with construction, deconstruction and demolition activities must be controlled for the protection of the public health, safety and welfare, and the natural environment.
B. State law addresses this need through the California Integrated Waste Management Act of 1989 and the California Green Building Code, which requires local governments to require fifty percent of construction debris be diverted from the landfill, and Senate Bill 1374, which requires annual reporting to the state on progress made in the diversion of construction related materials, including information on programs and ordinances implemented and quantitative data, where available. Required minimum diversion rates by project type are covered under the California Green Building Code and the City's local amendments in Title 19, Buildings and Construction, of this code.
C. The City’s Solid Waste Management Plan (1996 and 2000), the Source Reduction and Recycling Element (1992) and the Climate Action Plan (2009) are the City’s most recent documents guiding the City’s efforts toward its goal of zero waste.
D. In 2005, the City Council adopted a Zero Waste Goal to eliminate Berkeley's materials sent to landfills by the year 2020. The Resolution and Goal reference a goal of 90% and 100% for the diversion of all materials being landfilled. Since 2012, there has been continuous year to year overall increase of disposal tonnage and with the ongoing market conditions for recyclable materials, the achievement of this Goal proved unattainable by 2020.
E. In 2019, the Council adopted amendments to Chapter 4 of the California Green Buildings Code to require recycling and/or salvage for reuse requirements for most non-residential and substantial residential construction projects of 100% of excavated soil and land-clearing debris, 100% of concrete, and 100% of asphalt, and 65% of all non-hazardous construction and demolition waste.
F. Between 2021 and 2022 the City and its partners processed more than 53,000 tons of construction and demolition materials with a reported 77.15% recovery rate.
G. At the same time, Berkeley’s construction and demolition processing facility reported that as of November 2022, 62.78% of demolition debris and 57.42% of facility-wide construction and debris was used as alternative daily cover for landfills, representing an inefficient use of embodied carbon.
H. The City may adopt, implement, and enforce requirements, rules and regulations for local reuse and recycling of materials that are more stringent or comprehensive than California law, and this chapter establishes local requirements to further both state law and the City’s adopted policies.
I. This chapter’s goals are to implement best practice methods for separation, handling, and delivery of deconstruction and construction site materials to maximize the salvage of building materials for reuse, to reduce the amount of construction and deconstruction related materials disposed in landfills and to establish deconstruction and source separation requirements.
J. The requirements of this chapter are in addition to, the requirement in Chapter 19.37.040 of this code to achieve a specified diversion of materials generated from an applicable construction project.

12.39.020 Definitions.

For purposes of this chapter, terms defined in Chapter 12.32 shall have the same meanings in this chapter. The following terms shall have the ascribed definition for the purposes of applying the criteria of this chapter and other chapters as referenced.

A. "Approved facility" means a reuse, recycling, composting, or materials recovery facility which the director has determined can accept diverted materials, has obtained all applicable federal, state and local permits, and is in full compliance with all applicable regulations for reuse, recycling, composting, and/or materials recovery.

B. "Applicant" means (a) any individual, firm, limited liability company, association, partnership, political subdivision, government agency, municipality, industry, public or private corporation, or any other entity whatsoever who applies to the City for, or who is issued, the applicable permits to undertake a construction, expansion, remodeling, or demolition project within the City of Berkeley, and (b) the owner of the real property that is subject to the permit.

C. "Construction and demolition debris" or "construction and deconstruction materials" means (a) discarded materials generally considered to be non-water soluble and non-hazardous in nature (as defined by California Code of Regulations, Title 22, § 66261.3 et seq.), including but not limited to, metal, glass, brick, concrete, porcelain, ceramics, asphalt, pipe, gypsum wallboard, and lumber from the construction or destruction of a structure as part of a construction or demolition project or from the renovation of a structure and/or landscaping, including rocks, soil, trees, and other vegetative matter that normally results from land clearing, landscaping and development operations for a construction project; and (b) remnants of new materials, including but not limited to, cardboard, paper, plastic, wood, glass and metal from any construction, renovation and/or landscape project.

D. "Contractor" means any person or entity holding, or required to hold, a contractor's license under the laws of the State of California, and who performs any construction, deconstruction, demolition, remodeling, renovation, or landscaping service relating to buildings or accessory structures in the City.

E. "Covered project" means any project that is required to comply with the provisions of this chapter, as described in Section 12.39.030.

F. "Deconstruction" means the systematic and careful dismantling of a structure, typically in the opposite order it was constructed, in order to maximize the salvage of materials and parts for reuse and recycling.

G. "Demolition" means the partial or complete destroying, tearing down, dismantling or wrecking of any building or structure.

H. "Diversion" means any activity, including recycling, source reduction, reuse, deconstruction, or salvaging of materials, which causes materials to be diverted from disposal in landfills and instead puts the material to use as the same or different usable product.

I. "Recycling" means the process of collecting, sorting, cleansing, treating, and reconstituting materials that would otherwise become solid waste, and returning them to the economic mainstream in the form of raw material for new or reconstituted products which meet the quality standards necessary to be used in the marketplace. This term does not include transformation as that term is defined in Public Resources Code section 40180.

J. "Reuse" means further or repeated use of materials or items, including sale or donation of items, but not including recycling.

K. "Reuse organization" means an organization approved by the City to provide salvage surveys and accept materials or items for reuse.
L. "Salvage" means the controlled removal of items and material from a building, construction, or demolition site for the purpose of on- or off-site reuse, or storage for later reuse. Examples of items that may be salvaged include air conditioning and heating systems, columns, balustrades, fountains, gazebos, molding, mantels, pavers, planters, quoins, stair treads, trim, wall caps, bath tubs, bricks, cabinetry, carpet, doors, ceiling fans, lighting fixtures, electrical panel boxes, fencing, fireplaces, flooring materials of wood, marble, stone or tile, furnaces, plate glass, wall mirrors, door knobs, door brackets, door hinges, marble, iron work, metal balconies, structural steel, plumbing fixtures, refrigerators, rock, roofing materials, siding materials, sinks, stairs, stone, stoves, toilets, windows, wood fencing, lumber and plywood.
M. "Source separated single recyclable materials" means recyclable materials that are separated from other recyclable materials or solid waste and placed in separate containers according to type or category of materials and directly marketed as a single commodity.

12.39.030 Applicability
This chapter shall be applicable to all residential and commercial projects that include a whole structure demolition requiring a demolition permit. However, this chapter shall not apply to any project for which the completed demolition permit application was submitted to the City prior to [x].

12.39.040 Salvage survey and reuse required.
A. All applicants and other persons who undertake a covered project shall complete a salvage survey provided by the City, a reuse organization, or other third party approved by the City, prior to the issuance of a demolition permit. The survey shall itemize the materials and items eligible for salvage and reuse and the estimated weights.
B. Upon completion of the deconstruction and source separation of materials, the applicant or person responsible for the covered project shall ensure the items listed on the salvage survey are delivered to, collected by or received by, and certified by a reuse organization or other third party approved by the City, and shall submit to the City proof of delivery of salvage items in accordance with City regulations.

12.39.050 Deconstruction and source separation of materials.
A. All applicants and other persons who undertake a covered project where materials can be recycled or composted shall deconstruct buildings and structures in a manner to divert the maximum feasible amount of materials and debris from disposal in landfills. All construction and deconstruction materials shall be source separated. Materials to be source separated for recycling include, but are not limited to, steel, glass, brick, concrete, asphalt, roofing material, pipe, gypsum, sheetrock, lumber, wood, pallets, rocks, sand, soil, clean cardboard, paper, plastic, carpet, wood and metal scraps. Materials to be composted include, but are not limited to, trees, shrubs, plant cuttings, food scraps, and other material as designated by the City.
B. All persons undertaking a covered project shall submit proof of reuse, recycling and composting in accordance with City regulations.

C. The City, or its collector at City's direction, shall be authorized to inspect, upon reasonable notice, and audit individual waste streams generated at covered projects to determine compliance with this section.

12.39.060 Material collection.
Projects using a container provided by the City's collector pursuant to the provisions of Chapter 12.32 shall be deemed to have complied with the requirement to take construction and deconstruction related waste and source separated materials to an approved facility. Persons using any other method of collection shall dispose of such debris at an approved facility in accordance with City regulations.

12.39.070 No unauthorized containers.
No person other than the City's collector may place containers within the City of Berkeley.

12.39.080 Exclusions.
The provisions of this chapter shall not apply to the following:
A. Dangerous Structures. Any building or structure that has been determined by the City to be dangerous, structurally unsafe or otherwise hazardous to human life, and is required to be abated by demolition.
B. No Suitable Materials. Any building or structure that does not have materials that are suitable for reuse, recycling, or compost, as determined by the Director of Public Works. Materials unsuitable for reuse, recycling, or compost include insulation, painted or treated wood, rubber, and non-recyclable plastics.
C. De Minimus Exception. The Director of Public Works may waive any of the requirements of this chapter if documentation satisfactory to the director is provided to establish that the materials are not reusable, recyclable or compostable, the materials are incidental in quantity, or providing appropriate containers at the particular site would be unduly difficult.

12.39.090 Administration by City Manager.
A. The City Manager shall adopt written rules and regulations, not inconsistent with this chapter, as may be necessary for the proper administration and enforcement of this chapter.
B. The City Manager shall resolve all disputes concerning the administration or enforcement of this chapter, and their decision shall be final.

12.39.100 Enforcement and penalties
A. The Director of Public Works shall have primary responsibility for enforcement of this chapter. The Director of Public Works is authorized to take any and all other actions reasonable and necessary to enforce this chapter.
B. Violation of any provision of this chapter shall be subject to the provisions and penalties set forth in Title 1 of the Municipal Code unless otherwise specified.
C. The remedies and penalties provided in this section are cumulative and not exclusive.

12.39.110 Severability.
If any word, phrase, sentence, part, section, subsection, or other portion of this Chapter, or any application thereof to any person or circumstance is declared void,

unconstitutional, or invalid for any reason, then such word, phrase, sentence, part, section, subsection, or other portion, or the prescribed application thereof, shall be severable, and the remaining provisions of this Chapter, and all applications thereof, not having been declared void, unconstitutional or invalid, shall remain in full force and effect. The City Council hereby declares that it would have passed this title, and each section, subsection, sentence, clause and phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses or phrases had been declared invalid or unconstitutional.

12.39.120 Construction.
This Chapter is intended to be a proper exercise of the City's police power, to operate only upon its own officers, agents, employees and facilities and other persons acting within its boundaries, and not to regulate inter-City or interstate commerce. It shall be construed in accordance with that intent.

Section 2. Copies of this Ordinance shall be posted for two days prior to adoption in the display case located near the walkway in front of the Maudelle Shirek Building, 2134 Martin Luther King Jr. Way. Within 15 days of adoption, copies of this Ordinance shall be filed at each branch of the Berkeley Public Library and the title shall be published in a newspaper of general circulation.